

THE
ART OF MANUFACTURING
S O A P S,
INCLUDING
THE MOST RECENT DISCOVERIES:
EMBRACING
THE BEST METHODS FOR MAKING ALL KINDS OF
HARD, SOFT, AND TOILET SOAPS;
ALSO,
OLIVE OIL SOAP, AND OTHERS
NECESSARY IN THE FABRICATION OF CLOTHS;
WITH RECEIPTS
FOR MAKING TRANSPARENT AND CAMPHINE OIL CANDLES.

BY
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PRACTICAL SOAP AND CANDLE MAKER, AT COLOGNE, ON THE RHINE.

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P R E F A C E.

The endeavours to make known the continually improving methods in the art of soap-boiling for the benefit of the trade in general, have given birth within the last thirty years to a variety of publications treating of the subject more or less at large, but which, with the exception of a small number, have scarcely reached mediocrity, none gone beyond it, and have therefore rested on the shelf as without object and no value, and for the good reason that they were incapable of developing the incessant progress in this important branch of industry and its special relations.

It is this progress, and principally the improvement in the manufactory of soda and its employ in the preparation of soap, on account of the decreasing supply of potash, to which we have devoted for many years our most active exertions, best experience, and careful experiments, and to possess ourselves of them, we have not shrunk from making considerable sacrifices, with the assurance that whilst our brethren in the trade reaped the benefit of them in an economic point of view, we secured on our part active increase to the generous recompense which in a measure we have already happily realized.

With respect to the communications we have made, we are perfectly convinced that in no work whatever is there any mention made of them, and consequently all is as new as it is practicable, and that every soap-boiler of any experience will be able to follow with great ease the method we have prescribed; and we should hear with the liveliest feelings of proud satisfaction, that our communications have led the way to ulterior improvements.

We are convinced that our instructions will be found of the greatest utility in every manufactory of whatever extent it may be; and that they will facilitate the means of succeeding in any object necessary to be attained, and therefore we are enabled to make head against any opposition under whatever form it may appear.

We have given every requisite indication to develop the preparation of the soft soap, with that perfect knowledge of the subject arising from a profound consideration of its possible advantages; and likewise we have described the method of making hard soap with the employ of cocoanut oil and palm oil, whereby not only an improvement in the manipulation will be found, but also a considerable saving in expense, without deteriorating in the least the quality of the merchandise.

Cologne on the Rhine.

THE EDITOR.

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THE ART
OF
MANUFACTURING SOAPS,
ETC.

Establishment of a Manufactory for Green Soap.

For the manufacture of such an article, a ground floor only is required, and of dimensions according to the extent of the concern: supposing, for example, that a boiler containing fifty tons, or two hundred quarters, is to be employed, a space of seventy feet long, and twenty-five feet wide, is necessary. If such a manufactory can be established near a running stream, it would be attended with great advantage, because working with such water is much better than with spring water. The neighbourhood of saline or mineral springs must be especially avoided.

Utensils necessary for the Manufactory.

For boiling fifty tons, a round iron boiler is required, the plates being riveted, seven feet deep, and nine feet in diameter on the top, and sloping off to six feet diameter at the bottom. To empty the vessel completely, the bottom must be concaved nine inches. There will also be wanting a boiler, five and a half feet deep, and five feet in diameter, for boiling the lime and potash for the lie, or lessive. The bottom must be of iron plates, three-fourths of an inch thick; but the sides need not be so thick: the bottom must also be concaved, to empty it properly.

Also, three square iron reservoirs, four feet deep, and five feet square, must be procured, to mix the lime with the potash, and also three square iron reservoirs, each three and a half feet in diameter, and four feet deep, to preserve the lie. If much soda be not used, those reservoirs will be sufficient, for a smaller quantity can be dissolved with the potash; but should the consumption of soda amount to more than one-sixth of the potash, then it will be better to prepare the soda by itself. In that case three other reservoirs will be

wanting, each four feet deep, by four feet square, to dissolve the soda with the lime, and also another reservoir to contain the prepared soda lie. A separate boiler is not necessary to boil the soda with the lime, because that can be done in the potash boiler; but if not confined for space, and a little more expense be not an object, then a separate vessel for boiling the soda is to be recommended.

To mix the lime with the lie, an iron rod one inch in size, with a shovel at the end, half a foot wide, is used to detach the lime from the bottom. Also an iron rod with a rake at the end, a foot wide, with teeth six inches long, to scrape more effectually the lime from the bottom; and also a dung fork, with a wooden handle, to break the lumps of lime. The fork must be made one foot long, and nine inches wide, of stout iron plate, and divided into three, like a dung-fork; the teeth must be one inch wide, and the extremity must be crossed with a square piece of iron, to avoid scratching the rivets of the reservoir. A wooden-handled crutch is also wanted, with a plate of iron one foot square, and pierced with several holes an inch in size. Lastly, we will observe, that the reservoirs need be only three-eighths of an inch thick.

On the Analysis of the Water, to discover whether it contains any Substance detrimental to the Soap.

It is well known to all soap-boilers, that every kind of water is not suitable for the manufacture of beautiful, clear, green soap; and this arises from the different peculiar substances combined with it, and which it derives from the soil or earth from whence it issues.

The waters which are considered most unsuitable, are those which contain muriatic acid, carbonic acid, sulphuric acid, and salt; those in which iron, lime, and alkali are found, are less objectionable. It is therefore of the greatest importance to be able to know whether any noxious matters or properties exist in the water proposed to be used in a manufactory of soap. For that purpose, we will give some useful and necessary indications.

With the view of subjecting the water to a technical analysis or examination, a certain quantity must be put into a glass or glass tube; which, on the addition of particular ingredients, must remain undisturbed, and without losing its original purity. If there be any

muriatic acid in the water, a white precipitate will be formed by adding nitrate of silver: the presence of carbonic acid is discovered, when, by the addition of lime water, the same precipitate follows; sulphuric acid shows itself on the addition of nitrate of barytes. Iron is present, when, on inserting tincture of galls, the water becomes dark blue. Lime is disengaged by adding oxydated acid of alkali, which disturbs the water, and a precipitate is visible. Alkali predominates, when litmus paper, dyed blue, and, after being reddened in acid, becomes blue again, when immersed in the water. Finally, if lead or copper be present in the water, a black precipitate will be formed by adding hydro-sulphuric acid. These matters are found, if not altogether, yet separately, in almost every water; but always according to the situation of the spring, and in very different and varied proportions.

When the first three mentioned matters, namely, muriatic acid, carbonic acid, and sulphuric acid, exist in the water, a small quantity of salt can be used on adding soda, because the soap, on account of these ingredients, becomes disturbed; therefore, it would not be advantageous to boil with such water, for then

the profit of using cheap soda would be lost. The soap boiled in such water, although well worked, is disturbed at the commencement of the ebullition, to the same degree as if a large quantity of soda had been used originally, and becomes clear as slowly as that article: such defects can only be remedied by using a great quantity of lime. However, on these points the soap-boiler need not be vexed, because all water, without exception, contains these matters, and no spring water has yet been found, although drinkable, which does not possess those qualities with which it would not be possible to manufacture a good green soap. The neighbourhood of the sea, or salt-works, and mineral mines, form the only exception to this rule, because the springs near are so overcharged with extraneous matters, that the water is not fit to be drunk.

Should iron, lime, or alkali be found in the water, the making of green soap is not attended with any disadvantage, because the iron is absorbed by the lime; and when lime predominates, there is less need of it for corrosion, for when the water contains more alkali, the more lime is wanted. Such water is only found near turf-pits, or bogs of turf,

and on account of its softness, is very suitable for the manufacture of green soap. For toilette soaps, and for soap quite white, the employment of water containing sulphuric or ferruginous qualities should be avoided, because the first becomes of a blue colour, and the latter yellow.

Preparation of the Lessive, or Lie.

In the greater part of the fabrics, for the last few years, they have discontinued the use of pans formerly employed in the preparation of the lessive, into which they drew it from the bottom; on the contrary, they now use reservoirs, into which the prepared lie is drawn off clear from the top; the object of which is, to obtain cheaper and quicker labour, and from which, certainly, there results a saving of labour, and a considerable saving of lime. However, there are many soap-boilers who do not practise such exactitude, and work without boiling the lie with the lime; throwing in the lime, broken in small pieces, into a weak lie, which produces, it is true, an ebullition of lime with the lie, but does not produce such a corrosiveness as if the lime had been boiled with the potash. It

is indifferent whether the lie be first heated, and then the lime poured in, with the supposition that the boiling lime gives heat enough, which is an error, because a good corrosiveness is only obtained by the continual heat of the lime and potash together, unless much lime is used, which is not necessary for corrosion. The American potash will give a proof, being almost corrosive from its boiling, whilst the calcinated ashes have much less strength of lime. Therefore, it would be equally possible to obtain a saleable soap, by adding dry lime to the lie, when American potash has been used; but the soap would be much finer, if by boiling the lie had been freed more from the carbonic acid. It is true this method is very simple; but it has this disadvantage, that the lessive thus prepared is less corrosive, the soap not so clear, much softer, and of a disagreeable odour. That arises from the lime being an agent destructive of the carbonic acid contained in the potash, not having sufficient power; and this arises, again, because the lime dissolved in a strong lie is divided less finely than in a weak lie, and remains always in the form of small peas, although appearing as if boiled.

There will be found at the bottom small pieces, which appear like the lime found in the pans, according to the ancient method: this deposits itself so firmly at the bottom, that it is scarcely possible to remove it when cold. Such lime gives out its strength from its exterior only, and therefore cannot receive the carbonic acid sufficiently; whilst this defect is remedied when separated into particles as small as possible, before the lime is poured into the lessive. In order to attain this object, and get as good a lie as possible, it is necessary to make use of the lie remaining from the last boiling, and put it into the lie vessel, which must be but a third of the size of the boiler, and heat it underneath. When it boils, the potash must be poured in. The American potash must be previously broken into pieces as large as the fist, and boiled until entirely melted. This can be effected in one hour with calcined ashes, whilst with American ashes, it takes two or three hours.

The lie, when weighed hot, should be at most thirty degrees, and at least twenty-eight degrees. If more than thirty degrees, the American ash will not dissolve, whereas potash dissolves in thirty-six degrees; and if

weaker lie be used, then the first lie will be too weak.

When we have a good American potash, and would not use soda, one thousand eight hundred and forty pounds for fifty tons of soap are wanted, or two thousand of Russian or Hungarian, or two thousand three hundred of Rhenish potash. When broken entirely, then the lime must be added, which must be previously kilned or slacked in a tub holding about two hogsheads, placed near the boiler, and it should be poured in hot in the state of mortar. In summer, the proportion must be from twenty to twenty-five pounds of lime to one hundred pounds of American ashes; in winter, on the contrary, from fifteen to twenty at most may be used.

If soft grease be used, such as hempseed or linseed oil, then from thirty to thirty-five pounds of lime in summer, and in winter from twenty to twenty-five will be sufficient. For calcined potash, one-third more lime will be required, and we have the annoyance of not being able to stir up the lie in the reservoirs. The American ashes dissolve entirely by boiling; but it is not so with the calcined potash, with which often a quantity of sand is fraud-

ulently mixed. The mixture must boil two hours without ceasing, at a strong heat, and be stirred continually with an iron fork, such as the brewers use, to prevent any lime from sticking to the bottom. In slacking the lime, care must be taken to begin with a lie at two or three degrees of heat, until it is heated, and then the cold lie which has been used to dissolve the potash. Farther, in order to slack the lime well, that it may not burn in different places, not more than one hundred pounds must be slacked at a time.

Lastly, after having added the lime, and letting it boil two hours, the fire must be taken out, and the lie left to deposit until the next day, when the clear lie must be drawn off, or tapped and soaked again with a weak lie. It may then be drawn off the next day without boiling afresh. If the lie is not fifteen degrees, it can be soaked a third time, and this last lie may be used to commence boiling with.

Preparation of Lie from Soda.

In order to prepare a soda lie for green soap, the aforesaid weak lie of ten to fifteen degrees, must be poured into the boiler, and

made to boil. That done, add English or German soda at eighty degrees, until the lie attains the strength of thirty degrees, taking care to stir it well while pouring in, that no lumps be formed. When all is dissolved, the lime is to be added in the same manner as for the potash lie, with this difference, that for every one hundred pounds of soda, fifty of lime must be added, to make it more corrosive, and that all the substances which prevent the soap from clarifying may thus be absorbed by the lime. For that reason, the soda lie should boil an hour longer than the potash lie, consequently three hours. When it has sufficiently deposited, it must be drawn off, the first at twenty-five degrees, the second at twenty, and the third at fifteen degrees. These three lessives are poured together, to make one at eighteen degrees, which is proper for boiling. As it is of great importance, in winter, to have a soap perfectly greasy, which is neither long, disturbed, nor vitreous, a third lie is wanted, composed of Russian or Rhenish potash dissolved in water, and of the strength of twenty-eight to thirty degrees. As soon as the soap becomes clear by the frosty weather, this lessive is added as a last application, to

render the soap softer by means of the lime; but for the lessive without lime, no more than a sixth part should be used of the entire lessive, otherwise the soap acquires a bad smell, is not quite clear, and does not froth well.

Greases, or Fat, for Green Soap.

For making soft soap, linseed oil, hempseed oil, rape oil, olive oil, South Sea whale oil, and others are used. The use of liquid oil depends on the lowness of the price, and the season for which the soap is boiled. In Germany, South Sea whale oil is generally used, the import duty being but one shilling and sixpence per quintal, while on other oils it is five shillings. Soap, however, can be boiled with all sorts of liquid grease, although one grease does not saponify as well as another, and the product is very different. South Sea whale oil yields more soap, because, by the melting of the blubber the watery parts evaporate, while rape oil or linseed oil gives much less soap, as the mucilaginous plants which contain these oils only become heavy and evaporate, and do not absorb the lie.

For one ton of soap, five pounds less of whale oil are used than of rape oil, and four

pounds less than linseed oil. There is also an important difference in the weight of the stearine of the oil. The more stearine it contains, the more the soap is disturbed in the winter: hempseed oil, linseed oil, and clear whale oil, contain less stearine, and make, on that account, a better soap for the winter. The stearine matter in the oil can be discovered by putting it into iced water; and we will indicate the manner hereafter.

The faster the oil congeals, and becomes white, the less fit it is for soap for the winter. Besides these different oils, the following can be used, in case the prices are low, namely, stearine, brown linseed oil, sediment of olive oil, seal oil, palm oil, zott oil, dodder oil, sediment of palm oil, cocoanut oil, oleique, tallow, lard, and oil of rancid lard.

The first is the stearine which deposits in the casks and tubs; brown linseed oil is the sediment of linseed oil, which is mixed with the sediment of clarified oil and sold; zott oil comes from the south of France, and from America; the dodder oil is the poppy oil thickened.

Oleique is a manufactured oil, which, added the rate of one-fifth to other greases, can

be used in making soft soap, and costs always twenty or twenty-five per cent. less than whale or common oil.

Among the oils which amalgamate badly, lard oil must be classed, although very often used, and which, in America, is extracted by pressing the fat parts of the hog; and from twenty-five to thirty per cent. of hard matter is obtained, which is used for making candles. The residuum is an oil, more or less brown, compared to the South Sea whale oil. This lard oil amalgamates the best, when, on the evening before the boiling, it is boiled in a lie of twelve degrees, and left to settle until the next day, when the solution is effected.

However, much olive or tallow oil is used at present; but these absorb the lie very quickly, if used alone, and when mixed with other greases, come to the top, but which can be prevented by stirring quickly. Every soap-boiler should make it an invariable rule to amalgamate the potash, at fifteen degrees, with the grease, and let it settle during the night; for by this means, not only a sure solution is obtained, but the greater advantage of the finer parts of the grease developing better, and taking up more lie, so that from

one to one and a half pounds less whale oil can be used to the ton, than if worked faster.

Boiling the Soap.

The whole quantity of whale oil or common oil is to be put into the boiler at once in the proportion it is to be used: however, in order to know how much grease can be changed into soap with the prepared lie, we must ascertain how many barrels of one hundred gallons each of whale oil or other oil we have. To saponify a measure containing one hundred gallons of grease, one and a half measures of potash lie at twenty-one degrees will be wanted. We will take twenty-one degrees as a medium, for the lie should be divided into three parts, the first at fifteen, the second at twenty-one, and the third at twenty-seven, making sixty-three degrees, the medium of which is twenty-one degrees. One measure twenty-one degrees, the one-half at ten and a half, together, thirty-one and a half degrees.

When the lessive is thus prepared and calculated, the quantity of grease can be easily calculated with exact lie scales and measures; for the object would not be better obtained at thirty degrees than at thirty-three, without

the risk of spoiling the soap. If the lie of soda is used, thirty-one degrees would be too strong, for soda lie cannot be used so strong. If with mild grease, linseed or hempseed oil, one half of soda lie and one half of potash lie are used, the saturation of the oil will take place at twenty-six or twenty-seven degrees, whilst, as we have said before, the lie of potash requires thirty-one degrees. This arises, because neither common oil nor whale oil can absorb as much of the soda lie as the potash lie, without disturbing and thickening the soap; and for that reason, the employ of a greater quantity of soda requires a greater quantity of oil than that of potash alone: however, at the low price of English soda, the profit will always be considerable, although three lbs. more of oil to the ton be required. In every case, it is quite requisite in using a great proportion of soda to add a solution of potash without lime, which should be prepared before the ebullition, and at a strength of twenty-five degrees. This dissolved potash is added when the soap has absorbed nearly sufficient of the soda lie. The soap is then saturated with two-thirds of soda and one-third of potash dissolved, and this is done, because

the soap when almost saturated does not amalgamate well with soda alone, but on the contrary, in mixing with the potash water becomes a paste. Such a method also produces more soap than with the lie of soda alone.

Boiling Soap in the German manner.

When the quantity of lie required for the boiling is ready and duly calculated, the common or whale oil to be used is put into the boiler; when soda is not to be employed, for fifty tons of soap of two hundred and forty each, four thousand eight hundred and fifty will be required. If one half soda is to be used, then four thousand nine hundred and fifty will be required in summer, and in winter one pound more to the ton must be added for longer boiling. For a medium we will make a calculation of an operation, and begin with a boiling of four thousand eight hundred of whale oil and lie of potash without any soda. When the whole quantity of oil is in the boiler, for four thousand eight hundred oil.

24	measures	of	lie	at	15	degrees
24	"	"	"	"	21	"
24	"	"	"	"	28	"
72	"	"	"	"	64	"

3 : 64 | 21½ medium.

48 barrels of grease require 72 measures

each measure 21½

½ “ 10⅔

total . . 32 degrees.

With good manipulation thirty degrees are often sufficient. First, the lie at fifteen degrees is used, adding twelve measures to the oil and raking well from the bottom to the top. It is proper for this mixture to rest for a day and be raked during that time; for then the solution before boiling is secured, and also the oil expands better, and gives more soap. Then begin to boil with a moderate fire, and as soon as it is seen that the lie is united to the oil, which is known by the mass falling from the spatula in the form of light leaves, and does not run off like water, and if it remains on the surface when it begins to boil, and without the heat increasing all at once, the lie ascends from the bottom above the oil, which always happens with a slight noise, easily to be known.

The water on the surface should not boil yellow, and with flakes like dirty soap, nor throw out a considerable wet steam smelling

of the lie, for when the solution is perfect, this steam should smell of oil, and boil afterwards with a noise at the bottom of the furnace, or ascend to the top with a slight white froth. If the solution has not yet taken place, the boiling must be continued with a weaker fire for half an hour, by which means the solution will be effected without further obstacle. If not, three or four measures of lie at fifteen degrees must be added again, which will certainly accomplish it, because this cooling always produces a change. But if after the employ of this means, the object is not attained, the fire must be entirely put out, and the mass left till the next day, or, in continuing a very weak fire, pour in with a watering pot a weak potash lie at three degrees till the solution is effected. It will take place after adding two or three buckets of weak lie, and especially if a little old soap from a former boiling, taken from the cask, be added.

In this manner the union will be effected without further delay, and will be known by the bubbling of the soap, and also by the mass attaching to the spatula in leaves. In the bubbling, if steam arises smelling of whale oil, and of different colours, it is a sign that the

soap still requires some lie, of which five or six measures must be added directly, and boiled with it five or ten minutes, or until it is certain that the solution is effected, and the same quantity must be continued until all the weak lie is consumed.

Then only is the medium lessive to be applied, which is to be let boil each time that five measures are put in, to prevent the lie from sticking to the bottom. If time permit, we should leave the soap reunited to the lie at fifteen or twenty degrees, to settle in the boiler until the next day, and then begin to boil. In adding the first lie, it often happens that the soap condenses on account of the lime being too prevalent in the lie. This must be prevented as much as possible by a quantity of lie, without which, by the appearance of bluish steam, we know that the grease is evaporating. When the soap flows from the spatula in the form of large leaves, there is lie wanting, which must be supplied immediately, and added continually. In such a case, ten measures of lie must be put in, instead of five.

A soap disposed to condense quickly absorbs the lie, and condenses when it is wanting,

until it flows clear from the spatula; but the clarification of the soap is not perfect until the half at least of the strongest lie has been added, and twenty-six or twenty-seven degrees used for one hundred pounds of grease. The soap should then be allowed to boil properly, in adding lie from twenty-nine to thirty degrees per ton.

It is recommended to observe minutely the development of the soap on the sides of the boiler, before the boiling in the furnace affords the proof. For this purpose, a little iron pot, containing not more than half a pint, is made to boil with gas, or a spirit lamp. A spoonful of the liquor is put into this pot, and made to boil, to evaporate the water, to see if the lie is gray and the soap short. If this does not succeed in about two minutes, the soap still wants lie, which may be added without fear of spoiling any thing. Such a trial of a teaspoonful acts as well as adding an entire measure to fifty tons, and therefore one should proceed with much care and attention. Besides, this trial occasions no loss of time, since a circular tube, fitted under the pot, lets the gas escape by six or eight holes; or a spirit lamp with four holes for the meshes, makes

as much water evaporate in two minutes, as in half an hour in the boiler.

A strong lessive is to be added to the soap in the boiler, until a gray colour is seen in the drops poured on the glass; and this gray must not be more than a fourth, and at most a third of the size of the soap. This is a sign that the soap is entirely saturated with lie. If the soap still appears thready, and not short, it still contains too much water, which must be extracted by boiling, by which a firmness is obtained. If boiled with a lie above twenty-one degrees, the soap will lengthen on the glass, but it will be clear; if the lie is twenty-one degrees, and consequently not retaining more water than is necessary, then the soap will already show its slimy skin.

There is a dry surface, which the soap shows after cooling; on putting aside this skin, a shining and thready soap will appear, which will be more or less in proportion to the water to be evaporated. We can ascertain whether the soap still retains too much water, by pouring a little into a coloured saucer, and placing it on a bucket of cold water, to cool it quickly. In putting the finger on the soap, after its cooling, if it appear shining, there is

too much water; if, on the contrary, when the place touched is not at first shining, but appears like a rough grain, which afterwards becomes so, there is not too much water. However, as long as the roughness does not continue, and the place touched becomes brilliant, there is too much water, which must be evaporated until the shining does not appear, and rough grains maintain themselves at least half an hour. The soap is then short enough, and when the clarification is visible, the soap may then be considered as quite finished. If the lie is added a little too quickly, and the water is made to evaporate to condense the soap, the gray becomes more visible, and the soap is disturbed from having used too much, and possibly at two-thirds above proof.

After these operations, the soap will become shorter; but it will want the necessary transparency, a fault only to be repaired by adding oil. In proportion to the gray, one-half or one-third measure of whale oil must be mixed with as much lie, at two or three degrees, and a double quantity of hot soap from the boiler, and thrown on the soap in the boiler, when the clarification and firmness will follow after boiling one-fourth of an hour. Adding

the whale oil with the lie is more advantageous, because it comes into the boiler in that state of soap which would be caused by ebullition: this is necessary for a soap made with strong lie; otherwise, in adding oil without lie to the oil almost prepared, it would not produce as much soap, because it has not had time to melt, and sufficient humidity does not exist in the soap, unless it is obtained by continual boiling. Besides, the oil precipitates to the bottom, and proves that it evaporates by the appearance of a disturbed steam.

When, on such a soap, a fine gray appears, and the next day disappears, there is lie still wanting; in which case, as much cold lie must be applied as will cause the gray to reappear. The signs by which we know that the soap made with potash is finished, are the following: in drawing out the spatula, and turning it to pour out the soap, fine drops must appear, not thready, but having a leafy appearance. There should be seen, in the drops running along the handle, when beginning to cool, a slight curve not elongated. On pouring the hot soap into the glass, to prove it, a particle of silver gray should be seen, but which, after cooling, should disappear, and

leave the superficies of a spider's web on it. This is seen more easily, when, on pouring out a drop, the size of a shilling, on a glass, it is not effaced without adhering to it, and which, after cooling, on taking it off with a small piece of wood or a knife, still appears on it. One can find, by passing the finger or a small piece of wood over the soap, a little thickened, if it still lengthens.

The soap must then be left quiet for ten or fifteen minutes, when the line which at first appeared fine and saponaceous, will become shining, and appear watery. If the soap keep its rough grain, and does not resume its shining, it may be considered finished. If, on the contrary, it is not saturated sufficiently with lie, it will be dry to the touch, when cooled, and on remaining on the glass, will begin to be disturbed; so much so, that on the outside there will be a shining edge, and in the middle a troubled circle will be seen.

This same unëven appearance is found in soap strong with lime, and also when there is too much water; in which case, great attention must be paid to the gray of the lie. If this gray exist, on pouring it on the glass, and the soap remaining on it becomes troubled in

the middle, and on passing the finger over it, the shining appears again, the evaporation must still continue, without adding lie, until no more disturbed spots are seen, and the soap remains quite clear, with the exception of the surface, which resembles a spider's web. If these spots be deemed of no importance, as soon as the temperature becomes cold, and towards the winter, the soap will become either white or long (ropy.) Such a soap at first becomes heavy in the cask; afterwards, the superfluous water freezes, and at the same time, the soap being strong of lie, this last will ooze out, at least in part.

On the shortness of the Soap.

When the soap has nearly finished boiling, sometimes a proof is made in a saucer placed obliquely with the proof in the corner left to cool. Not more than about $\frac{1}{4}$ oz. must be poured out for this proof. After cooling, on drawing the thumb nail over the soap, if there is found a dry skin which does not attach to the thumb, and is dry, without being greasy, it is a sign that the soap is not well boiled, and that much water remains. The boiling must then continue until, on pressing

on the soap, it does not give way, but sticks to the finger, and under the surface, which appears to have finished boiling, the soap is seen to dilute no more. The gray of the lie should be perfectly seen on a coloured cup, as it remains longer on it than on a glass, but in no case should there be enough to cover the whole surface of the soap; it should be entirely lost in a quarter of an hour, otherwise, the soap is too strong of lie, and whale or common oil must be added. If some of the soap supposed to be finished is put on a glass, and collected together with a small piece of wood, and this repeated several times, it should not yield, but show a firm separation. In boiling in the summer, a small line of the size of a packthread may be left; but this must not occur in winter.

Too little Water in the Soap.

If the lie has been applied too strong, and the soap boiled too fast without adding lie, it may easily happen that after the boiling there is too little aqueous matter in the soap, which is discovered in the boiler when the soap concretes as firmly as if finished; in which case, after pouring out a specimen, it

is directly disturbed and short without a sufficient firmness, and when on pressing the finger, it takes up a skin like oil. Under this skin is a disturbed hard soap, at first short, but when left becomes glassy like frozen soap. Then the soap in the furnace does not boil in a sufficiently soluble state, and will have a disturbed appearance on the surface. If strong lie is then added to it, there will not be an immediate union, but some white spots will form, which will not mix with the soap but by continual boiling. In such a case, there is nothing more serviceable than to throw in a barrel of whale oil with some lie at ten degrees, and with as gentle a fire as possible. If this does not succeed, a little lie at six degrees with a little oil can be added, after which, when the clarification is obtained, the soap may be regarded as finished. This can be effected also by adding weak lie at from five to ten degrees, which is easily tried in a bucket; but in general the soap, which is short, disturbed, and vitreous, is too strong of lie, and for that reason, the addition of whale oil is to be recommended.

Too weak in Lime.

It is possible, even before the boiling, to know by the colour of the lie if it is too weak in lime, for when it is potash, it has a brown colour, not yellow, and smells of potash, and when poured into a pan, the froth of the lie disappears directly, and at twenty-two degrees ferments with sulphuric acid at seven degrees. In preparing, attention must be paid to boil the lime and the potash together for two hours, by which means, in case of calcareous disproportion, as shown above, the want of corrosiveness will be corrected with certainty. This must be specially avoided in summer in the boiling, because it prevents the firmness of the soap. It may be seen during the boiling, because the soap never concretes when lie is added, and more so, when on clarifying, the soap deposits itself flat on the glass like oil, and during the cooling whilst warm has the appearance of round soap mixed with lie. In this round mass, there are dark spots, which appear till the end of the boiling, and which, after cooling, are no longer visible. In no case can a fine clear article be obtained, such as it should be, when on touching it

- becomes softer, and when held longer in the hand begins to melt.

To manufacture a saleable article, it must not be boiled faster than necessary, because the produce will be less, and in washing with it the soap gives out a bad smell. These defects may also appear, even should the lie possess the requisite corrosiveness, and that is, when the sediment of refined oil has been used, which, from containing sulphuric acid, has taken away during the boiling the corrosiveness of the lime. If this sediment is to be used, the sulphuric acid must be removed, which is done by mixing with a barrel of sediment another barrel of corrosive soda lie at 25 degrees, which must be left to corrode cold and be heated afterwards. Then the separated soap will be found on the top, and the sulphurous lie at the bottom. The top is then taken off, and when almost clear it is added to the other, it no longer having the power to deteriorate the quality. The soap will reabsorb the suppressed lie through the aqueous matters. The lessive which is found at the bottom under the oil, must be put into the weak lie, to leave the sulphuric natron in the lime, otherwise the strength would be lost.

This method can be recommended to all who make use of the brown linseed oil of Holland, which also contains vitriol. When the soap is finished, there is no way to augment the calcareous strength, and when many have recourse to weak lie for that purpose, after its evaporation, the lime which is added is not capable of affording any important advantage.

Such a soft soap can be used very well in winter, but not in summer. If this defect be found in summer, 10 or 12 per cent. of melted tallow can be added, which will immediately reproduce the firmness. However, more than that quantity cannot be added without the appearance of white spots in the soap. Saponifying the tallow with weak lie before it is added, will be better than uniting it cold with the soap. A soap too weak in lime mixes badly, and for that reason, flour of potatoes should be spread dry over the soap. About one or two pounds per ton will be sufficient.

Too strong in Lime.

It is found when the lie is disturbed on adding lime water. The soap thickens fast, and concretes in the boiler when the medium

lie is added, and forms into small lumps. In proving, a paste dry and stiff appears, which is not sufficiently greasy when the gray of the lie shows itself. In the furnace, the soap concretes in boiling, is of a yellow white, and flows from the spatula in thick masses. This cannot be considered a defect, as it can be corrected by a lie without lime, after renewed proofs, which is the surest and most advantageous way of working. We will subsequently return to this method, and describe it more minutely, and will only remark for the present, that besides its certainty, it increases the produce of the soap, which cannot be when the calcareous state is too weak. When the soap is almost clear, some potash lie at twenty-five degrees must be added, until on proving the soap, it has lost its dry and stiff feel. If the soap is greasy enough before all the lie is put into the boiler, the non-corrosive lie must be discontinued, and the corrosive lie continued. In working with soda lie, the great stiffness of the soap is also much lessened, and if not enough, some salt must be dissolved in warm water, which if the soap is very watery must be twenty-five degrees, whilst for soap almost finished, brine at fifteen

degrees is required. One should ascertain how much the soap wants, as sometimes one pound is sufficient, and at others three pounds per ton are required.

In winter the surplus of lime must be avoided, otherwise the soap becomes white too soon; in the summer, on the contrary, it is necessary to obtain firmness in the soap, especially when it is from linseed or hempseed oil, or whale oil, and it does not congeal.

On the addition of Resin.

There are many soapboilers at present who add the resin to the soap immediately, and begin to boil: however, this method is very disadvantageous, because the turpentine in the resin evaporates in boiling, and scarcely any increase of soap is obtained: it is attended with another disadvantage,—such a soap with six per cent. of resin smells stronger than by another method with twelve per cent. In other fabrics pulverized resin is added, mixing one hundred pounds with one hundred and twenty pounds of soda lie at twenty-five degrees, by which the resin becomes perfectly saturated. This method is not to be censured, because on account of the weak degree of heat

to which the resin is subjected, the strong odour of the turpentine cannot exhale to any extent. However, this method is only applicable to a boiler of twenty-five tons, because in the larger ones the manipulation becomes difficult, and likewise the dust which escapes from the resin is very hurtful to the lungs.

Other manufacturers melt the resin with zott oil or whale oil, and boil them together; but this method is not to be recommended, because such a mass of grease must be added to the soap whilst being clarified, and before being formed, that it will produce the same disadvantage as when the resin is added on beginning to boil.

The method of using resin proved to be the most advantageous, consists in melting it in boiling lie, and adding it when the soap is finished. For this purpose, one hundred and sixty lbs. of potash lie at twenty-five degrees, are required for one hundred pounds of resin, and made to boil; then the pulverized resin is poured in, and the fire kept up until all is melted, and then taken out. This resinous soap must be mixed the next day, when the heat is not strong, and if so, the day after, otherwise the soap would be too warm; and

also on account of its weight, the resin would stick to the bottom, which occurs when more than ten per cent. is used.

To prevent this, the soap should remain in the boiler until it is cooled to from forty-five to fifty degrees of Reaumur; and by raking it well, it will not deposit in the boiler. This can be also avoided by raking into the soap two or three pounds of potato flour to one hundred of resin, which will cause the soap to concrete. This resinous soap is first to be mixed with a double quantity of finished soap, and raked in afterwards. The flour is no longer visible in the soap, for it is changed into a real gum, and takes up much water. Should it be necessary to add a little lie, there is not much trouble in doing that.

If green soap is to be made, resin must be added in moderate quantities, on account of its brown colour, and therefore three or four per cent. will be sufficient. To employ ten or twelve per cent. the brown colour must be taken away, which is effected by taking a measure of soda lie at twenty-five degrees, instead of potash, to dissolve it, by which the resinous soap will remain on the top, and the lie at the bottom. The soap on the top must

be taken off, and the brown lie at the bottom poured into the vat for weak lie.

By renewing this process with a lie which need not be so strong, a resinous soap is obtained which is only slightly brownish. It is then almost free from lie, like a white saline soap, and yields in weight but one to one and a half pound. When this soapy resin, thus deprived of lie, is added to the soap, there can be still some weak lie added, because the soap of resin contains but little watery matter; when the soapy resin is added, and during the cooling, before drawing out, twenty per cent. of resin can be used without forming a deposit; but then it cannot be made a green soap, but must continue brown.

Boiling Soap with half Soda Lie.

This method is generally employed in Holland, and on account of the fine soap made in that country, deserves to be the object of great attention. The pure hempseed oil, linseed oil, and oil of colza are used, with an addition of a little whale oil: in using the first two oils, more soda can always be employed than with the oil of colza. When much soda is used, the potash lie and the soda

lie must be added, each separately. They must be strong of lime, and when boiled together, the American potash will take forty per cent. in summer, and thirty in winter; but the soda lie must contain fifty pounds of lime for one hundred of soda, at ninety degrees. If the boiling is with whale oil, the proportion of lime with the potash must be diminished a third, but that with soda must be the same. Besides this lie, a solution of potash is still to be used, which should be always kept in reserve, and of a strength of twenty-eight to thirty degrees.

The boiling is then performed in the following manner: two-thirds of the oil to be used in the boiling must be mixed with the potash lie, which must not be less than seventeen degrees, and then the strong lie of twenty-four degrees to twenty-six is to be added. The soap is then united, but not clear; the remainder of the oil is then to be added, and directly the corrosive lie at eighteen is to be used. The quantity to be employed should be divided into three parts, two of which should be immediately put into the boiler with the oil. The whole is then heated, and the fire put out for three or four hours, to

give time for the soda to unite with the oil, which certainly could be effected by boiling, but would leave too much froth on the soap. The last is to be always charged with about one-third of non-corrosive potash solution, to obtain a more certain and better union, because in adding potash, the salt becomes inoffensive, and in general by working with non-corrosive lie a larger produce of soap is effected. This lie is continued until the soap is clear. Then great attention must be paid to proving the gray of the lie, which should scarcely be seen; but if seen, and the soap is not short but long and ropy, it must be left to boil, in order to evaporate the superfluous water: on concretion, the gray of the lie will still appear, which must be removed from the glass by adding oil or whale oil till the soap in a drop on the glass shows a gray not larger than a pin's head, and the soap should be short and no longer cold. When there is still much watery matter in the soap, it will soon be disturbed, and a clear border will be seen: if, on the contrary, it contains little water, only dull spots will appear, which should be entirely evaporated before the soap can be considered as finished, otherwise the soap would become ropy in the cask.

It must be considered a normal basis, when two-fifths or one-half of soda is used, and adding the lie when the soap is clear, to work gently and prudently, so as not to precipitate; because, with much soda, a separation takes place when the soap is too strong, and much time will be consumed before being able by adding oil to recover a fine union. In using so much soda, only twenty-six degrees per ton are required, but with potash thirty to thirty-one degrees are needful. After the fire is taken out, and the soap (judging by the proof) is finished, on adding some oil the gray of the lie will be got rid of. This is done for three reasons, first, to prevent the great froth which in using much soda always forms on the soap, and which cannot be raked in with it entirely, and can only be effected by adding some oil; and for a boiling of sixty tons generally from fifty to one hundred will be sufficient. Second, to prevent the deposit of the soda lie, which readily takes place in using one-half soda, and when the gray has been too strong. Third, to be able to add next day what may be necessary.

The next day, the froth is raked under the soap, and strong corrosive lie at twenty degrees

mixed with it without fire till on proving the soap recovers its gray; it will then possess sufficient firmness. When the soap has reposed three or four hours, it must be raked again properly and proved. If the gray is gone, some lie must be added, but if not, it is useless. The raking and mixing is indispensable for soap from soda, and increases its beauty to a considerable and surprising degree. It must be observed, that the lie added the next day is not done with ladles, but with a watering pot.

If it is intended to dye the soap green, for sixty tons, two pounds of ground indigo are used in proportion to the brown colour it must have. To dissolve the indigo, a strong potash lie must be evaporated in a small boiler to eighty-six degrees, into which the indigo is put, which will be dissolved after an hour's boiling; this mixture is then poured into the lie that is to be used the next day, and is poured on the soap by means of a watering pot. The soap should then be raked with the mixture, until not a single spot of blue appears, otherwise the spots would appear on the linen; the soap must then be left as long as possible in the boiler, that it may be put into the cask as

cold as possible. A deposit of the lie is thus prevented, and at the same time, the object attained of there not being so much smooth soap in the cask, and the froth not appearing on the top. When the soap in the cask is cold, there is nothing to do, but to take off the upper skin. In a soap well made, that which is under the skin can remain in the cask, because, when it is closed, that which is smooth and soft will be lost in the soap, because the internal heat of the soap will cause it to move to the top. By closing the cask, the surface will become as clear as the bottom. Putting in the indigo during the boiling, is not a good method; it is true, that the indigo would appear in the boiler, but afterwards it would become brown.

Many makers dissolve the indigo with sulphuric acid instead of lie, which dissolves the indigo directly into the smallest particles; and for this purpose, as much acid is wanted as will change it into a thick broth, which must rest two days, and then strong lie should be added, until litmus paper will no longer be coloured red, and the next day the soap must be coloured. If it is boiled with potash, the colour will hold, but if used with much

soda, the colour is lost in the cold soap. In this case, the soap will become a brownish green in the cask; but if exposed to the air, will become entirely green on the surface. We must not omit to remark, that such a soap has not a good appearance, and is not very saleable.

Brown Coloured Soap.

In many fabrics, soap is not coloured green, but brown; and especially where much whale oil or sediment of dirty oil is used, in order, by that means, to hide the dirt by the brown colour. This colour is given by gallnuts and carcuma.

For a boiling of fifty tons, one or one and a half pound of gallnuts, and as much carcuma, are employed. When the nuts are bruised, the whole is put into a kettle, and boiled with a bucketfull of potash lie at five degrees, and afterwards passed through a piece of cloth, for the purpose of dyeing. That which remains on the cloth will still give out some colour, which is to be mixed with lie at five degrees; the brown lie which is on the surface after some days, is used to boil the new colour in, throwing in the old.

Such a brown colour is very fine, and can be recommended for use, when whale oil or sediment of oil is employed.

For green or brown soap, we no longer dissolve the resin first, nor add it to the soap in a dry or pulverized state, but by means of an iron sieve, suspended by a roller over the boiler. The resin is put into the sieve, and let down into the soap when finished. The resin melts gradually, and passes through the sieve. This operation is continued with quantities of from seventy to eighty pounds, until the intended quantum is used, which gives the advantage of the odour of the turpentine not being developed during the solution, which saves the soap from smelling so strong, and likewise the small pieces of stick remain in the sieve. Then, by mixing with cold corrosive potash, or soda lie, at twenty-six degrees, the gray of the lie which was lost will reappear on the glass. There must then be no more boiling: however, it is a good plan to put a little fire under, that the lie which may have deposited at the bottom, and could not be raked to the surface, can mix better with the soap. It is sufficient when the soap presents sometimes a wavy appearance in the boiler.

The most advantageous manner of using lumps of
Tallow for making Soap.

Those who, besides the manufacture of soap, occupy themselves also in making candles, or only melting tallow as an article of commerce, can derive a considerable advantage from using the lumps of tallow, which can be more profitably employed than when, on being entirely squeezed out, they are sold to fatten cattle. When these lumps are made use of, they must be melted without acid, in an iron boiler. The grease must be skimmed off as long as any can be obtained, by pressing with the skimmer; and having left the lumps to roast until they are brown and hard, they must be thrown into a strainer or a tub, that all the grease may run out.

When tallow is dearer than oil, the lumps must not be much pressed, so that some of the grease may remain in them. The small lumps are taken out of the tub or press, and broken into small pieces by the hand. These pieces are left to cool, and cut in the grease trough with a sharp iron, until they are entirely pulverized, and afterwards put into one or two oil casks cut in half, with some lie of

potash at fifteen degrees, and stirred up with a shovel, that they may be thus washed. There must be just lie enough to cover the lumps. For a measure of lumps, one-half or two-thirds of a measure of lie will be enough. It is then left to repose five or six days, and stirred every day, in case there should be any lie sticking at the bottom.

At the end of six or eight days, the whole is saponified, and the lumps thrown into a greasy boiler, and made to boil for solution with the lie. If the solution has not taken place at fifteen degrees, the lie at ten degrees is used to boil with, and when a paste is formed, a little more strong lie is to be added, until it begins to be clear; then the whole is thrown into a tub, to remain until wanted.

In adding all the lie cold at first, these lumps give out a bad smell, and if, with two-thirds of a measure of lie, they do not become thin, one-third more lie must be added; but this disappears in a great measure in the first boiling, as soon as the solution of soap takes place. When cold, after boiling, these lumps are like silver gray soap, long and concrete; after the cooling, there should not remain

any of the lie at the bottom of the cask, which would prove that the desired solution has not been well effected. The boiling of the lumps can be kept up three or four hours, with good stirring, and added to the soap when cold, and with a weak fire, when the soap begins to be clear; otherwise, if the soap is thin, the lumps readily stick to the bottom and become red. It is therefore necessary to stir up the bottom with a rake, when adding them, that nothing should adhere to the bottom. The soap will then appear of a dark colour, and the lumps will look as if not entirely melted; but one must not be deceived by that, for those streaks, visible in the boiling soap, will not appear in the finished cold soap, dyed brown, which will be a transparent mass, and cannot be seen when soaping the linen.

For a boiling of fifty tons, three or four tons of this soap from lumps may be used, not in winter, but in weather free from cold, as in the middle of February, or the end of October; for the cold forms gray white lines in the soap, which proceed from the tallow contained in the lumps. If, for cheapness, linseed or hempseed oil can be used, instead of whale oil, the lumps can be added in winter.

The lumps from melted grease, worked and prepared in winter, can be preserved in casks without bottom till summer, and then employed for soap. In order to remove the filaments remaining in the soap charged with lumps, a plate of iron pierced with holes an inch long and two lines wide, is placed in the funnel through which the soap runs from the kettle into the cask, so that the soap may pass across it. When it is stopped, the lumps which fill the holes must be taken away with an iron scraper, and thrown aside as useless. This iron plate should be placed nine inches distant from the opening through which the soap flows out. If the soap is drawn out by a tap, an iron plate with turned edges must be made, so as to clear away the dirt during its running out.

Lastly, we will observe that in using lumps, a profit of from one shilling and sixpence to two shillings per ton more is made than by using whale oil, because the lumps change into a paste in the soap, and absorb a considerable quantity of lie; and further, all other substances may be added, as if they were not in the soap.

Boiling Soap after the English manner.

The English have a very different manner from that already described. It consists in using oil to clarify the soap instead of lie, with the idea, in which they have a firm belief, that the grease rarifies into fine watery particles, that by continual boiling it yields a less quantity of soap, and that the evaporation is effected quicker.

Whilst we can call in doubt the justice of the first point, because there is not enough time for the grease to be saponified with the weak lie, we yet allow the belief as to the quicker evaporation to be fully justified. Certainly this method is only practised in fabrics where little lie is employed. A quicker evaporation is not necessary when a little weak lie is used. The weak lie does not yield more profit than the strong, provided the oil has time to unite with the first lie and rest a day with it, in consequence of which this troublesome boiling is superfluous. When the oil evaporates, it is the fault of the manufacturer in not having given the lie early enough, and therefore a whitish disturbed steam arises, smelling of oil, and which in fact it contains.

The method is the following: whale oil, or some other oil in solution with weak lie, is poured, half at a time, into the boiler: as soon as the union is seen, the lie is added at short intervals, in great quantities, so that the soap has scarcely time to boil. About five measures of strong lie for fifty tons are kept back as a reserve, in case of need. After a slight boiling, all the rest of the lie is added in four quantities. The soap has thus a superfluity of lie at the time of the ebullition. It is allowed to boil until, on proving, the lie begins to deposit, on which the whale oil or other oil is added in the following proportions: if fifty tons are boiled, fifty measures of oil are required; if the half is used, the other half is divided into six parts, so that each time four measures are added. At the first appearance of lie being wanted, four measures are poured in. The whole is left to boil half an hour before taking out a proof, unless the oil is not yet in fusion with the lie. In this case, the union is certainly better, but by boiling the separation will again occur, and in proportion as the water evaporates.

After the first addition of the oil, it is permitted to boil an hour, and four measures are

then added. They continue in this way until the measures are reduced to three, of which one measure, with one-third measure of strong lie at three degrees, brought to a pap, is added, until the clarification and necessary shortness of the soap are obtained.

The rules to be observed in this method of boiling soap are: the soap on the glass should always show itself gray before adding the oil afresh; it should not be long, but short, and when lie is wanted, what is in the spatula after being plunged into the soap, becomes a whitish gray, although the soap is boiling in the furnace a clear yellow; on pouring out the proof on the glass, the soap is first clear and then becomes gray or dark; the soap having been already strongly boiled, and therefore needing oil, the gray shows itself directly; on the contrary, if the gray shows itself slowly, one must wait before adding more oil. It is quite necessary that the oil be not added before the soap is short, and if using potash lie, it should be at nineteen or twenty degrees at most. If the lie be stronger, there must be time allowed for its diffusion, before more oil is added—three-quarters of an hour may be sufficient. That is seen on

proving the soap, according to which one must act so as not to disturb the union.

Should all the oil be in the boiler excepting three or four measures, a little weak lie must be mixed with it each time, to accelerate the union with the soap, because, whilst the soap is becoming thick, the watery parts having disappeared, the oil will not dissolve so quickly as in a more liquid soap. In a word, the soap is worked with oil and a weak lie, until it is as firm, clear, and short as it should be. However, it is not advantageous to boil until it is clear, for the fire can be taken out better when the soap is too thick. The complete clarification is only obtained by adding and raking the oil, by which too great an evaporation of the watery matter is avoided, and likewise the inevitable result of a less produce. The gray of the soap should not be too strong when the fire is taken out; not more so than when, by means of a measure of oil, we are sure it could be made to disappear entirely. On pouring out the proof, the soap should appear clear, but on reposing, the gray should cover one-third of the soap. If the soap is still long, the boiling must be continued, which depends on the strength of the

lie employed. The using of the greases at equal prices depends on the temperature. In summer, South Sea whale oil, in winter, hempseed and linseed oil, in spring and autumn, one-half whale oil and one-half linseed oil. If whale is cheaper, it can be boiled without linseed oil, by a method shown hereafter.

Nine Substances to be added to increase the Quantity of Soap.

During the last few years, many makers of soap have made use of certain substances added to the soap, to obtain a cheaper article, by which means other makers, who know not those said substances, find themselves in a disadvantageous position—the soap being sold at a cheaper rate than they can afford to sell it. The knowledge of these substances is attended with advantages that each maker should take into consideration, if he would make progress against opposition. We will state, as follows, the substances we know of, and develope their application.

The substances to be added are:

1. Purified and white resin.
2. Brine.
3. Potato starch.

4. Dextrine.
5. Glue.
6. Ground gun-flints, (sulphate of barytes.)
7. Alum, or sulphuric clay.
8. Cocoanut oil.
9. Lie without lime.

To whiten the resin, it must be melted in a boiler, and left to repose until the dirt deposits itself at the bottom, which will take place in half an hour. The clear resin is then drawn off into a boiler, adding to every one hundred pounds a bucket of soda lie at nine degrees. The whole must be kept to boil for an hour, and then the fire lessened by opening the door. As soon as the boiling ceases, the resin deposits at the bottom, and the lie, which is quite brown, remains on the top. After having taken off and thrown away this brown lie, the resin at the bottom will be yellow, and not white enough, and must therefore be washed with water, one bucket to one hundred pounds of resin, which, like the lie, will remain on the top, and must be taken off and thrown away. By a third washing, the water will be entirely discoloured. The resin is then left to deposit, and placed in a cask to cool, or it may be changed immediately into

a resinous soap by means of strong lie. When the resin is washed, taken out of the boiler and cooled, it presents a yellow colour, like honey, and has almost entirely lost its strong smell, because, by the evaporation, the oil of turpentine still left in the resin goes off without losing weight, but, on the contrary, is increased, by the strength proceeding from the lessive.

If this resin be intended for sale to other soap-boilers, it must be poured into the casks, and, after being stirred several times, left to cool. This stirring is necessary, otherwise the resin will become sandy, in cooling in the casks.

If this resin is to be made into soap immediately, one hundred pounds of potash lie at twenty-six degrees must be mixed with eighty of resin, and a clear resinous soap will be produced, which can be raked into the finished soap; but it must be worked without fire. When applied in this manner, fifteen per cent. may be used, which would not give a stronger smell nor a browner colour than if seven per cent. had been used in another manner. In using fifteen per cent., it is quite necessary that the gray of the lie should be stronger

than usual, but the resin will absorb some of the lie afterwards. Moreover, purifying the resin gives this advantage, that in washing with the soap, it does not affect the skin, and does not chap the hands of the washerwoman. The pricking of the resin on the skin can be in a great measure avoided, by working the potash without lime.

Addition of Salt.

If the soap is finished enough to show the gray of the lessive, and if short and clear, to a boiling of fifty tons half a measure of whale oil is added to make the gray disappear. The day after, fifteen pounds of brine at nine degrees, to every ton, are raked in, which of course will make the gray reappear. If the soap is to be of a better quality, instead of fifteen pounds at nine degrees, ten pounds at thirteen degrees must be added, on which the soap will be covered with a kind of spider's web, but which disappears on the cooling, without the soap becoming glassy. This brine can be employed both in summer and winter, and produces a soap two shillings per ton cheaper. It can also be used in boiling with linseed or hempseed oil, and half soda and

half potash lie, in which case the brine must be at twenty degrees, and the quantity lessened six to eight pounds per ton.

Among all the additions, that of brine is the best and most advantageous, and a good soap-boiler will certainly make use of it, after having made his calculations. However, a strong proportion of lime is necessary, because, on adding salt, the soap becomes a little softer, which a soap weak in lime, and already soft, cannot bear. The addition of brine must never take place on the day the soap is boiled, whilst it is yet warm, thin, and glassy; and it must be poured on through a watering-pot, that it may be equally distributed in fine drops, and during this addition another raking must be given. The addition of resin does not prevent that of brine also, but, on the contrary, they can be used together. If the soap is disturbed after the addition of the brine, a little whale oil mixed with soap is to be raked into the boiler, after which the clarification will take place. To each ton, from one and a half to two measures will be sufficient.

Addition of Potato Starch.

This addition is already very ancient, and many soap-boilers employed it formerly, but latterly have discontinued it, not knowing how to get rid of the gum which is formed in the flour of the potato. We have made many experiments for that purpose, and have arrived at the following method, which we consider the best:

The potato flour intended to be used is to be dissolved cold in the proposed quantity of brine, stirring it continually and properly. It must be left to settle until the next morning, in a tub or vat, apart, after which it may be raked in among the soap. By its infusion with the brine, the lumps which form in dissolving it with the lie are avoided. In dissolving potato flour in water to prevent the lumps, it absorbs too much water to add to a soap nearly finished, and cannot be got rid of otherwise than by boiling, unless the soap has not been already strongly boiled. The soap containing potato flour must not be boiled, because in boiling the flour reunites in one complete mass, and forms places in the soap not transparent. For the same reason, a soap

which contains potato flour must not be re-boiled, because, after the boiling, the starch shows itself in points, as if the sediment of oil had been used. In this manner it is discovered when the soap of another maker contains potato flour. Should one have such a soap, which still contains too much water, and which becomes long in the cask, some finished soap must be added; it can also be merely heated and shortened by muriatic acid, without boiling the soap.

The potato flour not only absorbs the water from the soap, but it also requires its own saturation of potash, because it takes away the gray from the prepared soap. It can be used as much as eight pounds to a ton; but then the soap is disturbed, and therefore we recommend not to exceed four pounds per ton; and also it is only to be used in the summer months, because a soap of this kind, made in winter, offers no resistance to the cold, and is disturbed on account of the surcharge of aqueous matters resting in the soap, in consequence of the profitable employ of potato flour.

If the soap is well prepared and short, ten pounds of brine at six degrees can be used to

dissolve four pounds of potato flour; if the soap is still long, the brine must be at nine degrees. Thus, as we have already observed, the soap having need of lie after the addition of potato flour, some corrosive lie and potash at twenty-six degrees must be given to it, until the gray again appears.

Addition of Dextrine.

Dextrine is a flour from potatoes changed into a gum, which is made use of to stiffen linen, and to gum the cotton stuffs in printing fabrics. It is found in commerce in small brown lumps, and then ground or pulverized in a mortar to a state of yellow powder, which sticks to the wetted finger, and is transparent. It is treated in the same manner as the potato flour, but it renders the soap more transparent than the last: however, as it is dearer, it is not much used. The extra expense in using it is only five shillings per hundred weight.

The best method with the dextrine, is, to grind it small, and strew it in powder on the soap, and to rake in, for every pound of dextrine, three pounds of potash lie at five degrees. If the soap is still weak in lie, the last

must be used at twenty-three degrees. The dextrine has the same qualities as the potato flour, and should be preferred to the latter, as the soap keeps more transparent with it.

Addition of Glue.

Among the substances most advantageous to add in winter, is the cabinet-maker's glue, or animal glue, when it is cheap.

The glue must be soaked in rain water, and boiled with six pounds of water for one of glue, until it is melted. For each ton of soap, one pound of glue, with the said quantity of water, must be used, and raked in with the soap, the day after boiling: however, the gum having need of much lie for its saturation, a potash lie of twenty-three degrees must be prepared for the gray.

In working with the glue, the soap does not thicken as well as with the potato flour, or the dextrine, but is always thin, and the glue freely sticks to the bottom. The employ of it then is inadmissible, if much resin is used, because it will be found united with it at the bottom.

Great attention must be paid also in taking the soap from the boiler as cold as possible,

and to stir it often in large tubs, to prevent a deposit.

Addition of ground Gun-flints, (sulphate of barytes.)

This substance can be employed in making black soap; however, it is not suitable when the soap is to be used for bleaching, or for manufacturing purposes, as it always forms a deposit.

When sulphate of barytes is to be employed, five pounds per ton must be boiled in potash lie at twenty-two degrees, until all is melted. This takes place in two or three hours, and double the quantity of lie will be required for that purpose. The next day it is raked into the finished soap. No traces of it are seen in the soap, and the only fear is, that it will be felt by the fingers when rubbing it on the linen; but as soon as it is used in washing, and the strength of the sulphate is lost in the water, the first state is resumed in depositing itself. Although this deposit is so trifling, that it is sometimes not to be seen, still it makes the linen harsh and stiff. The cheapness of this substance, being but five shillings per hundred weight, is in a great measure the cause of its consumption.

Addition of Alum.

Alum, when dissolved, is suitable for an addition to green soap; especially is it advisable to be added when united with brine, because it destroys the gray produced by the salt.

When fifty tons of soap are to be boiled:

In Summer.	In Autumn.
400 lbs. water.	260 lbs. water.
37 " salt.	24 " salt.
12½ " alum.	8 " alum.
6½ " manganese.	4 " manganese.

These being well mixed together, will be added to the soap when nearly finished. If the gray is too much lost, after the addition of the alum, some lie must be given.

Alum alone can likewise be employed thus: for fifty tons of soap, fifty pounds of alum are dissolved in hot water, and strong lie of potash poured in, until in this boiling liquid some white spots appear, which precipitate. This deposit is sulphuric gravel, which the potash disengages from the alum. The potash lie must be continued until lacmus paper, when dipped in, preserves its blue colour, which will prove that the last trace of acid in the

alum is consumed; for until that is the case, lacmus paper becomes red.

This mixture is left to repose until the next day, when all will be precipitated. A clear water will be found on the top, whilst the sulphuric gravel will be at the bottom in a white mass, of the consistency of broth. The clear is drawn off, and kept until the next solution of alum; and the sediment at the bottom, diluted with a little water, is added to the soap. Some strong lie must be again added, because the sulphuric gravel consumes a great quantity of lie. This method is to be recommended in winter, as the soap will not then become too stiff.

Mixture of Soap with Cocoanut Oil.

Cocoanut oil is well known to be disposed to absorb some quantity of water, and for that reason, is made use of, in many instances, to increase the quantity of black soap. The best method is not to begin boiling with it, but to add it to the soap when finished; for in boiling with it, the soap becomes a heavy and badly shortened paste.

When cocoanut oil is used, for a boiling of fifty tons, one hundred lbs. are required. This

mass is poured into another boiler, and heated with one hundred pounds soda lie at twenty degrees, and thus changed into a soap, but too weak in lie. To this soap three hundred pounds of brine at fifteen degrees must be added, and when the whole is well united, left to cool. If this cocoanut soap is to be added, it must be cut into pieces of two inches at most, and given to the finished soap. These pieces dissolve very quickly, and unite with the other soap. However, we do not approve of this method, because a grease so hard as the cocoanut oil, when united with the soap, often produces white spots on it.

Although the soap is well saturated with this oil, and on proving appears well prepared, still it absorbs even in the cask much of the strength of the lie which it yet requires from the soap, which then becomes long and disturbed. This mixture is only calculated as a medium whereby a quantity of brine can be added to the soap, and may be done without the addition of cocoanut oil, which we have never considered as advantageous. Cocoanut oil is well known to produce more soap than whale oil, but to add it immediately on the ebullition is, as we have before re-

marked, a bad method, on account of the heavy paste it produces, and also too much froth in boiling. But bad cocoanut oil is often cheaper than whale oil, and the use of it consequently advantageous. To profit by this advantage, the soap must be made almost to boil, and the cold oil given to the soap, which is shortened by a lie at twenty-six degrees, as soon as the oil is melted. It is not advantageous to use more than fifteen per cent., as the soap by means of the cocoa nut oil is brought to a stiff paste, and by adding much, the profit is lost by the necessary evaporation. We therefore advise the use of cocoanut oil in summer, because in winter it makes soap white too fast, and in general only when much linseed or hempseed oil is used, because whale oil contains in itself cold matter enough already.

Employ of Non-corrosive Lie.

The employ of potash not corrosive, may, it is true, be recommended as a means whereby a favourable produce can be effected: however, it must be previously ascertained that the soap is already strong enough of lime, which is done by finding it sufficiently firm

on proving it. When non-corrosive is to be used, the soap should be nearly finished, and appearing as if wanting only about two or three measures of lie more to be quite finished; then some potash at twenty-five degrees must be given. If two or three measures of corrosive lie are supposed to be sufficient, then double the quantity of non-corrosive lie will be wanting to obtain the gray, which happens because a soap absorbs more, as the lie without lime is not so mordant, and although the union is not deranged, and no disturbance appears, yet the soap becomes softer, which is not disadvantageous when it is strong in lime, since, on proving properly, we have at hand the means of judging, and knowing when it is necessary to discontinue the use of the non-corrosive lie, and to recommence with corrosive lie to prevent the soap from becoming too soft.

Employ of Non-corrosive Lie to save Linseed or
Hempseed Oil.

In countries where they boil with whale oil only instead of oil, it is necessary to possess the means of sparing the oil, and still to be able to obtain an article which does not

whiten. This means consists in the preparation of lie without lime. For this purpose, the soap is boiled in the German manner, and the oil poured all at once into the boiler, and made clear by means of lie. If the soap is clear on the spatula without having sufficient lie, it must be given without lime, till the soap is clear, and if it is to be preserved till winter, not only must a third of the lime be retired by addition of potash, but also the lime must be frothed as much as possible by means of the potash.

The convincing indications should be the following. On pouring out the proof, the hot soap should run clear on the glass; after the cooling, melt gently on the finger, and be covered with a skin, as if boiled too strongly, and should whilst still warm on the glass, appear as if some dust had been thrown upon it. If the signs of not being too weak in lime have not yet appeared, some whale oil* mixed with lie must be added, and shortened again by means of potash lie. Such a soap boiled for the winter with whale oil, without adding other oil, will not bear soda, for the whale oil being a cold grease, the addition of soda makes the soap whiten still faster. The

appearance also is not so favourable, as it remains disturbed, and the smell is very disagreeable. The best advice to give is, when there is no great difference in price between whale oil and other oil, to employ one with the other. And on this point we must also take the season into consideration: the soap boiled in September is generally used about the end of November, and consequently has no need of oil; whereas, on the contrary, one-fifth can be employed in October, one-third in November, and two-fifths in December. By this oil we mean only hempseed and linseed oil, for all the other oils we know of do not resist the cold better than whale oil. If common oil and whale oil are equal in price, we should give the preference to oil for winter soap, because, in the first place, the article is finer, and more soda can be used, which is always cheaper than potash, and moreover, it is not necessary to evaporate the soap so much. Even if the difference should be one-sixth the cwt., we should choose the oil.

When the whale oil soap boiled in winter is not soft enough, and the vessel too full to add more oil, the object can be attained by mixing for fifty tons of soap one-half sulphuric acid

with half a bucket of weak lie, and pouring it on the soap whilst boiling, and continuing till it has attained the proper degree of firmness. By this method, the lime froths up, and changes into a sulphuric gypsum. We have in this manner given as much as three pounds sulphuric acid to a boiling, and have notwithstanding obtained a very satisfactory result.

Prompt and easy means of proving the quality of the Soda and Potash sold in commerce.

Among all the alkalies of commerce there is no soda or potash to be found of perfect purity; the least impure are those which contain carbonic acid and water; then follow those containing ashes, carbonate of lime, brick earth, argillaceous earth, oxydes of iron, manganese, and copper; also the muriatic and sulphuric alkalies, the last often fraudulently mixed, and which the consumer has not the power to discover.

For a long time a medium has been sought by which every one could prove for himself the value or purity of soda and other alkalies. The ariometer, which is so convenient for proving the lie and the acids, is of no use for

this purpose. Different acids have been tried, of which, the sulphuric acid has obtained the preference, being always to be found, and always of the same concentrated strength of sixty-six of Beaumé: the best and quickest way to ascertain the value of different samples of alkalis is by saturation with sulphuric acid.

Decroizelles has made an instrument for the purpose, which consists of a glass tube eight to ten inches long, and seven to eight lines in diameter, closed at the bottom by the pedestal on which it stands, and the top open, with a projecting brim, which is waxed to prevent the liquor running along the brim while being poured out; a scale of a hundred lines is cut on it from the top to the bottom with a diamond pen.

The proving liquid is composed of nine parts of rain or river water, which are poured into a bottle large enough to contain double the quantity. Then one part of concentrated sulphuric acid at sixty-six degrees is dropped into the water, at the same time carefully shaking the bottle. Without this precaution, the bottle might break in the hand from the sudden heat produced by the acid at the

bottom, to which it descends at once, on account of its specific gravity, but which shaking prevents. It is then left to cool. This mixture should be at twelve and a half degrees of temperature according to Réaumur, and nine degrees according to Beaumé.

If this mixture is stronger, viz., more than nine degrees, some water must be added to reduce it to the exact degree, and when under the nine degrees, as much acid must be given as will raise it to that scale, taking care always to shake the bottle when adding. This proving fluid must be kept in a bottle well corked or with a close fitting glass stopper.'

To prove with the alkali metre, the weight of one decagram or two shillings worth of potash is dissolved in a glass or cup of hot water sufficient to fill three-fourths of the tube. The solution can be hastened with a small wooden or glass stirrer. When dissolved, it is poured into the glass tube, which is then filled with water. This is poured back into the glass or cup, and another tube full of water added to it. It is then stirred and left for the dirt to deposit; the tube is then filled with the clear solution, which is poured into a cup for the proof. Some pieces of paper dyed a light red

by lacmus are placed on the rim of a small plate; on the other side some pieces of lacmus dyed paper, but not red.

The proving fluid is then poured into the tube which has been cleansed with water to the line O. The tube is held obliquely in the left hand to allow the fluid to run on the solution of potash or soda, the half of which has been poured into a glass for the proposed saturation. Whilst the fluid is flowing out in a small stream, an effervescence will be produced by the escape of the carbonic acid. When the liquid has been poured out to line forty, the saturation may be tried, and for that purpose a small quantity adhering to the end of the aforesaid stirrer may be applied to one of the red pieces of paper. If it becomes blue, more liquid must be added, but in a contrary case the potash is of an inferior quality. The liquid is still to be poured out, and proved from time to time till the effervescence ceases, and the blue lacmus paper becomes light red. The tube is then held upright, and it can be at once seen by the scale, how much of the fluid has been used. If the fluid shows fifty-six on the scale, then the potash has fifty-five, as one degree is to be allowed for the excess of satu-

ration. This fifty-five degrees is the medium degree of the potash of commerce.

If saving of time be an object, there is a quick method of proving, by dissolving only five grammes of potash in hot water and proceeding at once to the saturation. This is a very expeditious method, but less exact on account of the foreign matters mixed with the alkalies, and can only be resorted to by mutual agreement between buyer and seller.

The many thousand trials which have been made within the last forty years give the following proportionate result.

American potash	first quality	60—65
“ reddish caustic “	“	60—63
“ potash	second “	50—55
“ grayish caustic “	“	50—55
Russian white potash		52—58
Dantzig “ “		45—52
“ blue “		45—52
Alicante soda		20—33
Egyptian nitre		20—33
Soda and nitre	2—3 quality	10—15
Carbonate of soda crystallized and dry		36.

Decision of the exact time that the Soap can be kept.

Every soap-boiler should invariably possess the means of knowing whether the soap still in the boiler can be kept during the probable approaching temperature. In order to ascertain this point, we have a method perfectly sure, and at the same time very simple, which, without drawing the soap from the boiler, gives us the tranquillizing assurance that in the interval of two or three months, it will not deteriorate in the casks. For winter soap, we take ice for the purpose, and for summer soap, we make use of warm water. A thermometer is also wanted, which is not fixed to wood, a glass tube, some Glauber salts and muriatic acid; the glass tube must be six or eight inches long, and in the inside three-quarters of an inch in diameter.

In boiling soap, which should always be done, so that it will keep two months at least, we must take into consideration the probable temperature of those two months, and also the country we inhabit, which last point is of the greatest importance in this respect.

When we boil soap for the winter, we must, although, in September, so manage that the

cold which will arrive two months later, shall not exercise an injurious influence on the soap. In September the soap should already be able to support the temperature of the freezing point. In October, it should bear from three to five degrees, in November seven degrees, in December and January from eight to ten degrees below freezing point.

Also in February, it should still brave the temperature of the freezing point, and in March, by a heat of seven degrees, and in April and the other summer months by a heat of twenty degrees, it should not change from its original good quality.

It would be impossible to state an invariable criterion by the indications we are about to give, as all depends on the heat or coolness of the summer, and the severity or mildness of the winter; and therefore these indications must only serve as a means of calculation in boiling for the different seasons. Every soap-boiler should keep in view the time his merchandise will have to be kept, and his boiling must depend on that point. If a maker has customers near his fabric, he may suppose all his goods will be sold in a month, whilst the maker who sends his merchandise to a dis-

tance, should reckon two months as the duration of its sale. A maker who, in the first position, would boil beforehand for two months, would find in autumn the disadvantage of having a soap too much boiled, and without the necessity of so much boiling. The same inconvenience would occur in spring, if in March soap is boiled for the month of May, for one night's frost, which often happens in March and April, would make the soap white or long. We repeat, that every soap-boiler should consider well the time he will have to keep his soap; also the temperature at the time of boiling, and the probable state of the weather when his soap will be sold. To examine a soap for the approaching temperature, some ice is wanted for the months after October, which must be thus prepared.

A pint glass must be one-third filled with Glauber salts, and muriatic acid poured on it till the salts are covered. This mass when melted will show, on the thermometer placed inside, a temperature of twelve to fifteen degrees below zero. If much Glauber salts are used, the cold will last a long time. Glauber salts with sulphuric acid at forty-one degrees produce a cold five degrees of Réaumur.

Snow with the salts gives fifteen degrees; two-thirds of snow and one-third sulphuric acid will produce thirty degrees. This mass so formed is not ice, but becomes so, when water in small quantities comes in contact with it.

If a soap for the autumn must keep at six degrees below zero, the Glauber salts must be dissolved a little in the muriatic acid, on which the cold will decrease from twelve or fifteen to five or six degrees. Then some hot soap must be poured into the glass tube, and the thermometer introduced into it, and then the glass tube placed in the solution of ice and left there till the thermometer shows the degree at which the soap is intended to remain. When the thermometer has remained some time at this point, and in the ice, the tube is taken out, and also the thermometer from the soap. If after this operation, the soap is preserved clear and firm, we can reckon with certainty upon its keeping always to that degree, and without becoming disturbed and long. But should it appear still either troubled or long, it will be necessary to evaporate more water by a longer boiling.

When a soap boiled for the summer is to be examined to ascertain whether it will stand

the heat without becoming fluid, some water is used at the degree of heat to which, in mid-summer the temperature generally arrives. In this respect it is sufficient to expose the soap to a trial of twenty degrees of Réaumur. If after that trial the soap does not become soft, the heat will neither injure nor soften it. If the soap has been well prepared, (and all the qualities of a good soap boiled enough have been seen on the glass according to the before described indications,) should it become soft, this defect must be remedied before being put into the casks. First, it must be tried to repair the fault by an addition of lessive to increase the hardness, as the soap can bear more of the gray of lie in summer than in winter; if this does not succeed, and the soap is still soft, there is lime wanting without doubt, which must be given in the next boiling: to increase the hardness it is indispensably necessary to add some melted tallow to this boiling.

Under these circumstances, according to the softness of the soap, from four to six per cent. of whale oil or common oil must be poured into the soap, and as soon as it is melted, as much soda lie at thirteen to fifteen

degrees must be poured in till the soap is saturated afresh: the mixture must boil for an hour, and the soap worked according to the instructions, and after that the hardness will appear. In such a case it is not right to saturate the tallow with strong lie to save time in boiling; for in so doing, the tallow will not unite with the soap sufficiently, and will form white spots in the soap later. In those countries, where in summer, on account of the low price, or to avoid giving the soap the smell of whale oil, they boil with linseed or hempseed oil, it is necessary at the commencement to add five or ten per cent. of tallow, or ten to fifteen per cent. of palm oil when it is cheaper, by which also the firmness is obtained: however, we must observe that this addition of tallow or palm oil must not be employed from October until March.

If whale oil or oil of colza is boiled with an addition of lumps, then the addition of tallow is superfluous: however, if the soap does not preserve its necessary hardness, it is either too short of lime, or too weak in lie.

Lastly, we will add, that in using palm oil, the preference should be given to that which is whitened, to which point we will refer hereafter.

To shorten the Soap without Fire.

It often happens, that in preparing the soap, too much water is left in it; and as a consequence, the next day there appears in the boiler more water than there should be; no other means to remedy this defect were formerly known than to light the fire again, or to shorten it with salt and strong lie: but if the soap shows enough of the gray of the lie, an excess only will have been given, and a disturbed soap, which should especially be avoided for the winter boiling. Therefore, as the soap cannot bear another boiling, when an augmentation is applied, we have recourse to the following method.

One or two tons of soap, according to the size of the boiler, are put into a tub or an open cask, and muriatic acid poured on till the lie is separated from the soap. After letting it stand till the lie has sunk, the soap which is separated is put into the boiler, and the lie which cannot be used again, is put aside. This soap, containing no water, will absorb sufficient in the boiler. It will melt with the other soap, and take up as much water as it has lost, and thereby all the soap

in the boiler will shorten without the need of fire. By this process seventy pounds of lie to each ton is taken away. Such a separation can be effected by the addition of the strongest lie, but the granulated soap separated and swimming on the lie should be mixed with a little oil before being added to the soap, otherwise the soap would be overcharged. The proportion of muriatic acid remaining in the soap is not at all injurious to it, but sulphuric acid must not be employed.

If the soap in the boiler is a little cold, that which is to be added can be heated in another boiler, or, in case of extremity, a little fire may be made under the large boiler, but not more than is necessary to heat it moderately; for on account of the substances added, the mass must not boil, otherwise all the advantages hitherto obtained would be lost.

Manufacture of Transparent Soap (Oleine.)

By this name is called the oil obtained by the pressure of tallow or palm oil when making the bougies of stearine, and of which a fourth and even a third is employed for black soap, in order to produce a firmness in

the soap. In the fabrics of stearine, there is generally a soap made by the name of oleine, which is much esteemed not more for its qualities or washing purposes, than for its agreeable odour of violet. This soap is not made entirely of oleine, but with an addition of one-fourth or one-third of whitened palm oil, which gives it the smell of the violet.

To boil such a soap, a lie as strong as possible must be prepared, and immediately begun with one at twenty degrees instead of fifteen, and finished with one from twenty-five to twenty-eight degrees.

A great proportion of lime is necessary, for the oleine contains much vitriol, which absorbs the lime from the lie, which should not be short of lime. When the soap is worked with lie too weak, it becomes too soon troubled, and white: the American potash only should be used as much as possible; it contains more lime or corrosive strength than all the others. We cannot advise the use of soda for this soap; for if used the soap whitens too fast, and on that account the increase of soap by adding other substances is inadmissible. The whitening so quickly arises from there being still much tallow in the oleine, and also the palm oil is still charged with stearine.

In autumn and in winter, the addition of linseed oil is requisite, and in the proportion of one-half oleine, one-fourth linseed oil, and one-fourth palm oil. As the soap of oleine is boiled more strongly than whale oil soap, a hundred pounds must be used for each ton of two hundred and forty pounds, whereas with ninety-six pounds of whale oil, a ton of soap can be made. The soap of oleine cannot be dyed green, because the brown of the oleine will not admit of a fine green: an addition of gall-nut and curcuma is the best.

Fabrication of soft White Soap.

Different sorts are made under this denomination, and are distinguished from each other by their softness or hardness. The best is that which is quite soft like green soap, and preserves that greasy state, and does not dry on the sides through resting in the casks.

To make white soft soap, sixty per cent. of melted tallow and forty per cent. of South Sea whale oil are boiled together, with potash lie of twenty-two degrees for the medium, as for green soap till it is short and clear: although the clear will remain only a short time on the glass, yet this soap will be white after cooling.

If for a measure weighing one hundred pounds a measure and a half of lie at twenty-two degrees are used, the proportion of lie will be well arranged, and if the soap does not yet show the gray, more lie is to be added until it is seen on proving on the glass, whereon it must be boiled, to make it short, for this soap must be as short as black soap. When this is effected, two pounds of salt must be added to each hundred pounds of grease, and dissolved by stirring continually; or instead of salt, some brine at twenty-eight degrees is poured in, but which must not boil with it. The salt is added that the soap may become whiter and lose the clear appearance of green soap. If it is wished to increase the quantity of the soap, some white clay can be added, first broken into small pieces, and boiled in lie at twenty degrees, and raked into the soap when settling before the cooling; another mixture can also be employed, which produces a soap equally good, soft and white, and of an agreeable odour, viz., sixty per cent. of whitened palm oil and forty per cent. of linseed oil.

This is boiled as we have before described, but with the difference that sixty per cent.

potash and forty per cent. soda lie are to be used. The soda lie must be added last, with a moderate fire. For this sort of soap, baked clay can also be employed, and also ground gun flints. These two ways of boiling which are thus described, yield one ton of soap for the hundred pounds. If a prudent addition is to be made, not more than fifteen pounds of clay or gun flints should be used to the ton, otherwise the deposit in the wash tub would be too remarkable.

Soft White Soap yielding 400 pounds.

To make such a soap, there must be:

75 tallow

25 cocoanut oil;

and made to boil together with two parts of potash lie and one part of soda, till the soap leaves a sharp biting on the tongue; then a brine at twenty degrees must be added till a strong paste is formed when cooling, and on pressing it with the finger on the glass it separates; on which it is to be put into the cask. This soap cannot be weighed like the green soap with a ladle, but must be cut from the cask. Being very cheap, it is made use

of, in many countries, for washing and scouring.

Soft Brown Soap, partly firm.

This soap of forty per cent. tallow and forty per cent. whitened palm oil boiled with one-half potash lie and one-half soda lie; after the boiling, twenty-five per cent. of resin mixed with potash lie until it is saponified must be added. The resin must have absorbed enough lie to show the gray when proved, and be clear; it should be properly raked into the soap, so as to prevent a deposit. The sediment of potter's clay can be used; but this soap must be always drawn out cold, because the clay and resin, being heavier than the soap, readily deposit at the bottom.

Examination of potash to discover whether it is mixed with soda or salt.

With respect to the potash to be used, the American should always have the preference, as being the most powerful, and depositing the less dirty matter, which is all consumed by a strong boiling. But it is a subject of complaint that the American potash is not so

strong as formerly, which is attributed to a mixture with soda. After the American, the Russian, the Hungarian and Rhenish potash follow, neither of which is so strong of lime as the American, nor so good for boiling lie, as the lime concretes more in the others, and is more difficult to be stirred in the lie tubs.

It is often complained that the different sorts of potash are adulterated, and often with truth, there being clay, crystallized soda, and salt frequently found in them. Potash mixed with clay produces in the solution a considerable earthy deposit which renders the raking with the lime more difficult: however, this fraud can be easily detected, for on examining the potash with the alkali metre, an infinitely less degree of strength is found than a good potash contains.

The addition of soda is not so easily discovered, because it likewise shows its strength on the alkali metre; but it is not that soda of seventy to eighty per cent. which is mixed, but common soda crystallized, which is first pulverized and mixed with a blue, to give it the outward appearance of potash. This fraud, when it exists, is easily discovered by a magnifying glass, which shows the parts

dyed. When these parts are in water, the colour disappears, whilst the transparent parts which the colour could not penetrate remain in the hand.

This method is employed to discover the falsification by salt, which betrays itself still more easily, because in weighing the potash with the alkali metre, the salt which it may contain does not indicate the degrees, and consequently the low degree on the metre leads immediately to the detection.

To find the mixing of muriate of soda (kitchen salt) with the potash, a certain quantity of potash must be weighed and dissolved in rain water previously saturated with clear nitrous acid. Then some drops of a diluted solution of nitrate of silver are added, on which a gradual precipitate will quickly deposit at the bottom. From the quantity of this deposit an estimate can be formed of the extent of the adulteration. But as the proof is rather expensive, it is better to saturate a certain weight with sulphuric acid, and to evaporate the mass, to have it dried with a moderate heat in a porcelain saucer. The salt mass is then dissolved in rain water, and brought to a state of crystallization. The sulphate of

potash will crystallize first in small pointed crystals of a pyramidical form, and afterwards, when no more sulphate of potash deposits from the remainder of the lie, the sulphate of soda (Glauber salts) formed from nitre; or the muriate of soda (kitchen salt) will crystallize in the form of columns, which exposed to a dry air, decompose, or are reduced to powder. By the quantity of this last salt, the extent of the adulteration with kitchen salt or soda is found. A complete or exact chemical analysis is not necessary for the object we have in view, and it is sufficient to know the rules whereby a falsification on a grand scale can be detected.

In order to increase the weight of the potash it is often taken out of the casks and spread on the floor for eight or ten days and often stirred. The object in doing this is perfectly obtained, as it increases the weight from six to ten per cent. without being in the least falsified; but potash worked thus is hard and round like small nuts, and pieces are found in the middle of the casks white on one side and blue on the other; in short, this potash has generally the appearance of having been powdered with dust. Every one who

is not able to form a judgment by the exterior appearance of potash can easily convince himself by means of the alkali metre of its value.

Whitening Palm Oil.

Palm oil is whitened or discoloured in four manners:

1. By heat and contact with air.
2. Chromate of potash and muriatic acid.
3. Sulphuric acid and black magnesia.
4. Nitrous acid.

To whiten palm oil by heat when the operation is suitable to the purpose and on a large scale, an iron plated pump is necessary. It is made like the pumps used to draw the oil from the casks; it has no spout, but only a straight tube with an iron valve in the sucker. The oil is pumped from the top, and flows into an iron plate fitted round the pump and pierced with holes, that, in running through them into the boiler, the oil may come in contact with the air. To make the pump stand upright in the boiler, it is fastened below and above to an iron cross, to prevent its moving when worked. The pump must be the width of a hand distant from the bottom, to keep

the oil (which might otherwise cake by the heat and stick to the bottom) in movement by pumping. The pump should be of the size of a stove-pipe, (five or six inches,) and of the form used on board ship, and with a handle as long as possible, so as, while pumping, to avoid breathing the emanations, which are very injurious to the lungs. This labour is best done in a covered shed, open on the sides.

The day before the whitening, the palm oil must be melted, but the sediment which deposits must not be thrown into the boiler. After having made a fire under the boiler, and heated the mass to sixty or seventy-five degrees of Réaumur, the pumping must commence, and the heat be increased to eighty or eighty-five, and later to ninety degrees—proving from time to time the gradation of the heat by a thermometer fixed to the end of a stick, in order to keep it within limits. As soon as the heat comes to eighty-five degrees, the fire must be kept up gently, and the oil will begin to be whiter, which can be seen better by dropping a little on a white plate and letting it cool. If about one thousand pounds are prepared, after boiling two

or three hours, and pumping continually, the oil will be of a clear yellow; and then it is time to put the fire completely out, because whitening the oil until the yellow disappears is not right, for this takes place by the heat which the oil contains in itself. As the boiler still retains much heat, after the fire is taken out, the pumping must continue for half or three-quarters of an hour, to prevent the oil from caking.

Instead of a pump, an iron plated sieve may be used, which, fixed to a long pole, can be put into the oil, which is allowed to run through, and is thus subjected to a contact with the air for some time.

After being left until the next day, the oil is to be separated from the sediment and worked. In its cold state it will be of a gray yellow, which is lost in the boiling, whilst the sweet odour, which is peculiar to it, remains.

This method of whitening oil must be done by pumping in an iron boiler, and the boiling should not be brought too fast to the greatest heat; but rather there should be three hours at least allowed from the commencement of the boiling to its being whitened, otherwise

the oil cakes too much. Bad palm oil often requires six or eight hours' boiling.

Whitening by Chromate of Potash.

The oil must first be freed from its sediment by being melted and precipitated; and then, with a heat of sixty-five degrees, half a pound of chromate of potash, previously dissolved in two pounds of water, must be added to every one hundred of oil, and carefully and constantly stirred. On every one hundred pounds of oil, one of muriatic acid must be then poured, which, with a continual stirring, will produce a green colour. All must remain until the following day in the cask, when the green will have sunk to the bottom. The clear oil on the top can be drawn off, and when washed once or twice with warm water, can be used.

This method can be recommended to those makers who cannot, on account of the neighbourhood, occasion the strong smell arising from whitening the oil by heat. If sulphuric acid and black magnesia be employed, then to every one hundred pounds of oil at sixty-five degrees of heat, three pounds of sulphuric acid and four of magnesia must be added, by which also the yellow will be got rid of; but

even with a double washing, the oil will not have such a fine appearance as if whitened by heat or the chromate.

On adding nitrous acid, the oil becomes entirely whitened, but the yellow will return as soon as potash or soda is used.

The latest improvements in the manufacture of Hard Soap.

It is well known to every soap-boiler, even although possessed of but little practical experience, that within the last ten years, hard soap has been made by most makers after the new method of not unsalting it, and selling it with all the lie that has been added still remaining in it. This, however, is only possible when an addition of not less than thirty per cent. of cocoanut oil is worked with the tallow or palm oil, because the former oil is as yet alone known to possess the property of combining with strong soda lie, and forming a glutinous yet hard soap; a property which arises from cocoanut oil containing a considerable quantity of albumen, and a small proportion of alcohol, by the warming of which a mass is formed, binding the lie in the soap; and this can only be freed again when the

glutine is destroyed, either with much salt or a very strong lie.

This method, however, has been practised by us for fifteen years, but is disapproved of as not efficacious, by many soap-boilers, who are not versed in the manipulation; and if some go so far as to reject it entirely, it is from their want of general knowledge that they are not in a state to derive any advantage from it. But it is indispensable for every soap-boiler to make himself acquainted with the method in question, both to be able to make headway against opposition, by having a cheap article to sell, and also because the method of making soap with soda is continually improving, and the price of potash continually advancing, in proportion as the first material (the wood) begins to fail.

Influenced by such opinions, we give below an extended explanation of preparing every kind of hard soap with soda. We will omit, however, boiling with wood potash, as we suppose this book will be purchased only by those who desire to learn something new, and to introduce the new soap into the few places where the old is still used. There are different reasons given by those who are opposed

to this method, for their opposition. Sometimes it is alleged that such a soap becomes crusty in winter, at others, that the froth does not last long enough, and that a faster consumption follows. All these defects can be obviated by working with caution, and being contented with a good produce, without looking to as great a profit as possible.

The use of cocoanut oil offers the opportunity of introducing a great quantity of water into the soap, which induces many makers to work with it as much as possible; and in consequence of the limits, which should always be kept in view, being passed, it has not been possible to obtain a soap saleable for its durability. To obtain such an article, half tallow and half cocoanut oil, or half cocoanut and half palm oil, should be used, and working with cocoanut alone be abandoned.

As to ourselves, we have hitherto adopted that plan, and have preserved our customers, whilst other makers, who have worked with cocoanut only, and have lowered the price of their wares, have been ruined. Nevertheless, we will describe the manner of making this soap, to assist those who have motives for working in that manner.

There are two ways of working this not unsalted soap—the cold method without fire, and the other with fire; the two methods being so far different, that, by the first, the soap is quickly finished, and has no need of salt; and by the other, it must be salted. The soap by the cold method, forms no paste, and only a mechanical mixture of the tallow with the lie takes place; whereas, by the hot system, the soap forms a paste, and to obtain the necessary firmness, and a profitable boiling, some salt must be added.

For that reason, soap made by the cold method, dissolves more quickly in the water than that which has been boiled; therefore, in those places where the soap is cut into the water, this first kind can be used, and where the linen is soaped previous to being washed, that with salt is the best.

In both cases, it is necessary to use only the soda at ninety per cent., because when it has seventy or eighty per cent., the soap incrusts, which proceeds from the salts contained in inferior soda changing into glauber salts, and, like saltpetre, form in the soap by the least cold. Indeed, it can happen, in using soda at ninety per cent., that the soap will

incrust through the cold, which is the fault of the maker in having, in such a case, neglected to calculate on the approaching temperature, and counteracting its injurious influence, by adding some potash lie, as both salt and much soda make the soap cold.

This kind of soap being at present sold at a very low price, water must be given to it on a large scale, that one may meet competition as to cheapness; indeed, the soap should be so far filled with lie, that from two hundred and eighty to two hundred and ninety boxes may be made from one hundred pounds of tallow and cocoanut oil. It keeps well in summer, but will give way to the cold, unless made without fire, and with one-sixth potash and five-sixths of soda.

The use of corrosive soda, or the corrosive soda lie, such as sold in the fabrics, must be avoided, because a useful soap cannot be made with it; this corrosive soda being the deposit of crystallized soda, which lie, like the American potash, is boiled so long as to become dry in the boiler, and by this treatment becomes corrosive. Every soap made with it retains the lie, and is, in its fresh state, so hard that it can be scarcely cut; a quality

which is nevertheless lost in about eight or ten days, after which the soap becomes soft. In winter this soap always incrusts.

Another defect in the soap made by the hot method, consists in there appearing a greasy and yellow crust on the soap in the boxes, if placed in a humid place, which proceeds from the sulphuric oxyde or iron contained in the soda. This is found to be in the soda, by strewing some pulverized lead into the lie, when, after examining it in the glass, some black spots appear. In this case, as much clear corrosive lie must be added as will cause the nitrate of lead to change into a white precipitate in the lie. The lie will then deposit and become clear, and can be used without being made corrosive again by lime.

For the quantum of lie for five hundred weight of soda, it is the rule to add two pounds, and at most three, which, at seven per cent., will not much increase the cost. We have had corrosive soda, the sulphuric acid and iron of which made the soap as gray blue as if dyed with black magnesia, and yet the means we have indicated has sufficed, with the lie in reserve, to remedy the fault. The addition of blue vitriol will have the same effect.

In such a manner can white soap be made from black soda, not purified, and from soda made from burnt sea-weed, and called barilla or kelp. The blue in the soap, when boiled and salted, can also be thus prevented, and which often rests in the interior of the soap, whilst the surface only whitens by exposure to the air.

Preparation of the Lie.

The soda is dissolved in a weak, old soda lie, the soda being added till the lie attains thirty degrees, which can only be obtained in the vessel in which the lie has been previously made to boil, and the soda added, with continual stirring to prevent boiling over. For this operation, a cast iron boiler must be placed near the lie boiler into which a hundred pounds of lime must be broken in pieces, and heated by adding one or two buckets of cold water. When the required heat is obtained, some soda lie from a former boiling, and at eight or ten per cent. must be poured in, and constantly stirred till the lime forms a thick broth, then pour on the solution of soda in the boiler and continue till there is enough in the vessel

to saturate the soda in the proportion of sixty to a hundred.

When five cwt. of soda are used, three cwt. of stone lime are required, which must be slacked in three portions, there being but room for one cwt. if well stirred in slacking, for in taking more it burns in places and loses much of its strength. The soda and lime are kept boiling two hours, and the fire is then put out. The mass rests as it is till the next day in the boiler, when the soda and lime will have precipitated to the bottom; the clear lie must be then drawn off into another iron boiler, and the lime which rests is wetted again with weak lie or with water to the height in the furnace at which the lie drawn off had reached. After this has deposited, the lie is drawn off and added to the other. The first will be twenty-six or twenty-seven degrees, the second twenty, the medium of which is twenty-three or twenty-three and a half degrees. The third will be fifteen degrees, which can be raised to twenty-three by evaporation, or used in the next lie to dissolve the soda.

When the lie is drawn off from the lime to four degrees, and all poured together, an

average strength of eleven to twelve degrees is obtained, which is evaporated in an iron boiler to twenty-six degrees, when hot, whereby a very considerable sharpness is brought into the lie, produced by evaporating the water, and continued boiling. If this kind of lie is to be used for preparing soap by the cold method, a change in the proportions of the lie is necessary, without which the soap will be too sharp and acrid, when used. To prevent this, less lie must be used, according as the soap-boiler may find judicious, so that the soap may be neither too strong nor too weak. Soap made from an evaporated lie is always much harder and drier on the surface, after cutting, and has also the advantage of requiring less soda than when no evaporation takes place. I, therefore, recommend this process to all soap-boilers who leave the lie in the soap, as it well repays the expense arising therefrom; and the soap, owing to the smaller quantity of soda used, is less liable to become rough on the exterior.

The reason of this is, that the weak lie contains more strength in lime than strong lie, and by evaporating the water from the weak, not only does it increase the strength

in lime, but also destroys the saltpetre. It is also advisable not to use the lie immediately after evaporation, but to keep the same six to eight days in a well covered iron reservoir, and then to draw off the clear lie from the foul deposit at the bottom. As it is, however, necessary to supply the place of the omitted lie, in order, in cheap soaps, to obtain a correspondent weight, it is necessary to add a quantity of salt water equal to the deficiency of the lie, which will give the desired result of twelve to fifteen degrees. By reference to the following table it will be seen how many pounds of lie are necessary for the different sorts of soaps.

TABLE,
Showing the Proportions and Produce of Soap made by the Cold Method, with Evaporated Lie.

Kinds of Soap.	Tallow	Coco- nut oil.	Palm oil.	Lard.	Lie.	Degrees.	Salt wa- ter.	Degrees.	Potash.	Degrees.	Produce.
Cocoanut oil, No. 1,	—	100	—	—	56	36	—	—	—	—	153
Paris toilette (round),	20	30	—	8	31	36	—	—	5	36	87
Do.	—	25	—	75	50	52	—	—	—	—	150
Windsor, (square,) .	66	34	—	—	77	30	—	—	13	30	185
Shaving, No. 1, . . .	66	34	—	—	—	—	—	—	—	—	214
or	33	34	33	—	120	27	—	—	—	—	214
Shaving, No. 2, . . .	33	34	33	—	120	27	12	12	—	—	226
Washing, No. 1, . . .	60	40	—	—	125	27	25	12	—	—	244
or	30	40	30	—	—	—	—	—	—	—	—
Washing, No. 2, . . .	40	60	40	—	135	27	50	15	—	—	278
or	—	60	—	—	—	—	—	—	—	—	—
Ordinary cocoanut oil	—	100	—	—	—	—	—	—	—	—	—
or	10	90	—	—	225	21	75	12	—	—	400
or	—	90	10	—	—	—	—	—	—	—	—

After these operations the lie is so far ready as to be suitable for a soap not boiled, and yielding two hundred and eighty pounds for a hundred pounds. To obtain a soap yielding two hundred and forty pounds, a lie of twenty-eight degrees is wanted, which is brought to that strength by evaporation, whilst for two hundred pounds from a hundred of lie at thirty degrees, and for a hundred and fifty from a hundred, thirty-six degrees will be required. In the last class toilette soaps are included, and for which the lie must be prepared in another manner, which we will indicate hereafter.

For a soap made by the cold method, and yielding from two hundred and ninety to three hundred pounds from a hundred, a cast iron furnace not walled is required with a deep bottom, which will hold two hundred and fifty pounds of tallow. This boiler is placed on an iron circle having four legs and two feet high. The boiler must enter into this circle to prevent its oversetting, and when placed it must be not more than three and a half feet high, otherwise it would be difficult to work it. The forms should not contain more than two and a half cwt., and should have

five separate partitions with a cover fitted to each in a circular form, put on together easily. Also a round beech pole three feet long, and two inches in diameter to stir the soap, also a little iron crutch with a shovel six inches wide, with holes pierced in it, and provided with an opening to fix the handle; finally, an iron bar four feet long and half a foot thick, and a thermometer without its wooden back.

Common Soap yielding 290 pounds.

For this soap sixty per cent. cocoanut oil and forty per cent. tallow, are mixed and heated, and left to repose until the dirt in it has deposited at the bottom. The dirt which is on the surface must be skimmed off with a sieve; the grease should be heated to fifty degrees Réaumur, and the lie to twenty degrees of heat. Then fifty pounds of cocoanut oil and grease are to be put into a tub, and a nail driven into the two sides to mark the height to which the grease reaches. Two quantities of fifty pounds of grease and cocoanut oil are then measured in the same manner in the tub, and both poured into the iron boiler standing on the circle.

Into this quantity of one hundred pounds of grease three tubs of lie at twenty-two degrees, which have been filled up to the nails, and which weigh two hundred pounds, are to be added. The lie is poured into a tub placed above the boiler containing the soap. From this tub a tap or spout leads into the boiler. When the grease is in the boiler, and the lie in the tub, the tap is opened, and the lie let run into the grease. As soon as the running commences, the stirring with the beech pole before mentioned must also begin, and one quarter of an hour allowed for the whole of the lie to run from the tub into the boiler, during which, the stirring must continue without ceasing, sometimes to the right, then to the left, and then round as quickly as possible. By this means the soap will first appear clear, but will afterwards thicken, and the stirring must be continued till the soap is so thick that on taking out a proof with a wooden spoon no lie flows from it, which result is generally obtained in half an hour. It takes sometimes but twenty-five minutes, but also sometimes three quarters of an hour are required, depending on a quick union of the grease with the lie or not, and when the grease

after having received two-eighths of the lie has the appearance of a thick paste, but which is only in appearance; then it remains always short. Likewise it happens by this manner of working, and especially in adding so much lie, that it is entirely separated from the soap, and there is the appearance in the boiler of salted soap; but it is not to be feared on that account that the soap has failed, but then, instead of the beech pole, the rake must be employed to rake up the lie from the bottom continually, so as to effect the perfect union of the soap with the lie. By this treatment, on the gradual cooling of the soap, there will be no more separation, and instead of an oblong grain, a shorter and rounder grain will appear: after raking, this grain will become first a thin liquid, a sign that it unites with the lie; after which, on the surface of the soap a fast cooling skin forms, which resembles hot tallow covered with a cold skin. After these signs, the soap may be supposed to be nearly finished: however, the raking must be always continued till the soap thickens so far as to make the raking more and more laborious and difficult, and the soap has the appearance of a cold rice broth; it must also stick

to the sides of the boiler, and have lost its watery appearance in the boiler, and on removing the rake the soap rises in a heap which does not soon separate. There must be neither lie nor tallow in a separate state, but all well mixed in a mass.

The soap should not be at more than thirty-five degrees of heat at the conclusion, which can be assured by the thermometer. If it is colder than thirty degrees, a pan one foot wide with burning charcoal must be put under the boiler till thirty to thirty-five degrees of heat are obtained.

When all these secondary circumstances are duly ascertained the soap is finished, and without loss of time must be poured into the form, placed near the boiler and covered. The soap which is then cold will heat in the form, which is the effect of the lie uniting with the grease which is before mechanically mixed together, and which in the covered form becomes so hot that drops like sweat appear; yet this appearance proves the goodness of the soap, for a soap which does not become hot in the form is not good, and shows that it has too little or the lie has had too little lime. Thus, when notwithstanding the pro-

per quantity of lime has been used, the lie is not strong enough of lime, it can only have arisen from the negligence with which it has been prepared; either the lie has not boiled long enough with the lime, or, to save labour, the lime has been thrown in dry pieces into strong lie and slacked therein. In both cases, a defective soap is produced, of weak consistency, and wet to the touch; also the soap can be stirred too long, for example, when it is thickened properly; if the stirring is still continued, it easily happens that the soap will stick in drops to the different sides of the boiler, and particularly when the soap is too warm or the lie not properly heated, as also when old tallow has been used.

If the heat is not more than thirty-two degrees, the raking must continue till no more grease appears, and if at thirty five degrees the raking must be continued without fire till finished. But, generally, the grease shows when the soap is nearly ready, and when it is made too warm. If the soap is too cold in the boiler and nearly finished, it will separate from the lie, which by putting some fire under and a good stirring can be prevented. This can also happen by discontinuing stirring

before the soap is finished. In this case the soap becomes thick in the boiler and loses the lie by stirring, which afterwards will not mix with it perfectly: a soap is always defective when the stirring has been interrupted.

The grease of melted candle cuttings must by no means be used, because it rises too quickly to the surface of the soap, and afterwards a soap is produced from them not sufficiently firm and of a yellow colour, moreover, care must be always taken to use only freshly melted tallow for soap made by the cold method.

The greasy places which we have before mentioned, and which are seen in the soap on stirring, are of a yellow colour resembling the oil of colza, and we must be cautious not to confound them with spots of lie, which are clear and white. If there should appear on the surface of the soap any of those greasy spots we have described, there may not be any at the bottom of the soap; they then unite later with the soap, or by the warmth communicated to them in the form, rise to the surface and are of no further prejudice than becoming more mordant in the mass than when seen on the surface. In general this appearance rarely occurs.

If it is desired to have a streaked soap, cin-nabar should be without hesitation employed, in which case for three cwt. of soap four ounces will be sufficient. It must be bruised on a plate or on a little flat vase made on purpose, and mixing it with half a pint of purified oil of colza till it is made into as fine a *bouilli* as possible, and then poured on the soap when it is finished in thin lines, and mixed with the mass by good stirring till there is a layer of red on the top, two inches deep. This upper red layer is then driven under with the crutch fifteen or sixteen times; by this means the red passing through the holes in the crutch is divided through the mass, and the soap may be quickly poured into the form intended and ready to receive it: it must be carefully poured in layer upon layer, for in turning it in with the spoon, there would be large white spots in some places and red ones in another. Besides, it must not be poured always in the middle of the form, but in the sides, that the red may not concentrate too much. When the mass is in the form, flowers must be traced on it with an iron rod. These are made first in straight lines from one side to the other at

one or one and a half inches from each other, and then in a cross direction. If long flowers in the soap are desired, it must be left to itself without more stirring; yet we cannot conceal our preference for the round marbled soap which is called by the trade "flowery," and to obtain it, after stirring from the bottom we make circles as wide as the hand in succession in the form. We then make a new row of circles running into the first circles, and so continue till all in the form is marked with these circles. The soap thickens fast, and as it is not proper to stir long, the pouring and the stirring must be done quickly. In stirring the red concentrates towards the rod and leaves a red line.

If from economy a cheaper colour than cinnabar is wanted, then minium can be used, with this difference, that instead of four ounces of cinnabar, one and a half pound of minium will be required, and even then, as fine a colour is not obtained, and moreover, the conviction soon arrives, that the red of minium disappears entirely when the soap has been exposed to the air a few days. Even in adding one-quarter Venitian red to the minium, although the colour is durable, it is

not so fine by any means as with the cinnabar. As to the price, the difference is but sixpence the cwt. which is repaid in having a good soap.

If after consideration it is decided to use cinnabar, that of Vienna by all means must be chosen, and of the unadulterated quality, for it often happens, that it is so much mixed with sulphate of barytes, that it will not colour. It is also often mixed with a red which comes from Sweden, which is with difficulty distinguished from the true cinnabar: it possesses the quality of sometimes losing its colour in the soap, and at others turning yellow, which is owing to the acid it contains. Fine blue soap is dyed with ultramarine, which must be previously mixed with oil like the cinnabar; the blue gray of common soap is obtained from black magnesia, the yellow, with roucou boiled in oil.

We believe that we have described all the methods in a way explicit enough to enable every soap-boiler to work after it; and even should one boiling at the beginning not succeed as could be wished, still there is a saleable article produced, and if by chance half or a whole measure of lie be lost, such a disad-

vantage need not be repeated, but the next time given thicker.

A better kind of Soap, called Grain Soap, (yielding
240 pounds.)

For making the best quality of this soap, there is required sixty per cent. of tallow and forty of cocoanut oil, which is melted and purified in the manner before described. This mixture gives an excellent shaving soap, whilst, by using half and half of tallow and cocoanut oil, a harder soap is produced. The lie to be used for this soap must be twenty-six degrees of strength.

A hundred pounds of fat or grease, or two measures of fifty pound each, are poured into the stirring vessel, taking care that the heat be not more than forty of Réaumur, and the lie not more than twenty degrees. To this hundred pounds of grease—two and a half measures of lie at twenty-six degrees—which will weigh a hundred and forty pounds, must be allowed to run on, stirring it quickly during this operation, which must last ten or fifteen minutes, because with so strong a lie the soap thickens very fast. The quick stirring must be continued till the lie cannot deposit, which

is known by the signs we have described under the title of a second sort of soap. Every soap prepared ready to be poured should be so thick that on stirring no bubbles should form, and the stirring itself should cause a noise like that made in playing in the water.

A quicker method can be made use of, which is to add the lie in five minutes, and stir very quickly, and continue till a skin forms on the soap like that on tallow which begins to cool, on which the emptying may commence without delay. This operation does not consume more than ten minutes. For this reason the soap may be put in the form soon, because it contains less lie than the first described, yielding two hundred and ninety pounds, and consequently will not so easily separate. If the soap is put into the form in a thin state, just when the skin shows itself, smaller boilings of half a hundred weight, should be made, and the drawing out done with great regularity, for if stirred too long and poured out soon after, the soap is disposed to deposit. We advise all young beginners not to think of adopting the quick manner of making until after repeated experiments they have acquired a sufficient certainty of their succeeding. For

them, the best method is to stir it properly thick. The quick method not only requires profound knowledge, but it has also the defect of not becoming white, and uncertainty as to the colour, for by the slightest error, the soap will be quite red, or lets the lie run from it, and for these reasons we do not employ this method. By this method a hundred pounds of grease will yield two hundred and thirty-five pounds finished soap.

We make it a fixed rule for a soap stirred when cold, when all the lie has been added and the soap begins to thicken, to put some burning coal underneath. It should be a quarter of an hour at the longest after all the lie has been given, the soap being then generally under thirty degrees Réaumur. This heat accelerates the union, but when put under too soon, the tallow will mount to the top, as the proper union with the lie has not yet taken place.

Pearl Soap.

There is in Germany a great demand for a kind of soap with a variegated colour given to it in the boiling, which can be exceedingly well imitated and made at a cheaper rate, out of *this soap*, by the following method :

After the soap prepared by the cold method, it stirred in the boiler, a portion of finely triturated soap containing red or blue colour is rubbed with the thick soap. For this purpose we take a light floating soap which has dried long, and which, during the boiling, had been coloured red, blue, or yellow, and grate it to powder over a tin grater, then throw it into the prepared soap, and keep constantly stirring it in the frame.

To a hundred pounds of white soap two pounds of triturated soap are sufficient. In this manner we can impart four different colours to the soap, when four sorts of coloured soap are added. This is then sold under the name of pearl soap.

To this soap, as well as to all perfumes for soap, I now add tincture of musk to make the scent in the soap more durable.

This tincture is prepared as follows:

Fifteen grains of musk are put into half a pint of alcohol, and this into a bottle. The bottle is then placed in hot water, without being corked, and left to draw half an hour, during which time the odoriferous oil is imparted from the powder to the spirit. These fifteen grains are sufficient to give the scent

of musk to four hundred pounds of soap. The residuum of the musk can again be saturated with spirit, and even for a third time. If musk bags are cheap, they can be employed instead of powder.

Windsor Soap yielding 190 pounds.

By this name a firm soap is well known, which, on account of its containing so little acid, is equally fit for shaving, and washing, and being perfumed with ethereal oil is greatly esteemed, and sought for. It is composed of two parts tallow and one part cocoanut oil, with the same weight of lie at thirty degrees. The fat is left to cool to thirty-five degrees of heat, and the lie composed of nine parts soda, and one part potash at twenty degrees is poured on it, at the same time stirring it well with the pole. After being stirred eight or ten minutes, the soap will be covered with a skin, and as soon as it shows itself the soap is finished.

When this is accomplished, the soap is poured quickly into the form and covered, and the next day it can be cut.

To perfume this soap, supposing it composed of from eighty to one hundred pounds of fat:

6 oz. bergamot,
6 oz. oil of lavender,
3 oz. Portugal,
3 oz. oil of thyme,

must be mixed with the tallow before adding the lie. Should the mass taste strong on the tongue, five or six pounds less of lie can be given to this quantity. Besides, it can be easily discovered by the drying whether the soap is too strong, for there will not be a lively red, but a bluish red, which the air will take away, but still the soap will not wear a good appearance.

Windsor soap is not cut into pieces as large as other soaps, but only about nine or ten ounces in weight, and on the general length of the soap eight divisions are marked, and those divisions cut into eight pieces, which are very saleable in that form. If it is desired to set off these pieces to advantage, they can be rounded with a file, which takes off the edges of the soap.

To dye the quantity of eighty pounds of grease of variegated colour, three ounces of cinnabar are required; but if wanted entirely red, double that quantity will be necessary, and must be added to the tallow before the

lie is used, otherwise the colour will not be regular, but white places will appear.

Windsor soap should be poured into forms not higher than six or eight inches, and these made wide and flat, otherwise the soap will be too hot, and white places will form: to prevent too great a heat, they are not to be covered.

The above is the common method of making hard soap in the cold manner; and although this treatment may appear to many manufacturers as too trivial, yet, on the other hand, we must not omit to mention, that when one thousand pounds of grease and cocoanut oil are melted in the vessel, one man can make twenty-five hundred weight of soap in a day, and with the assistance of another workman, a larger quantity may be made than the most extensive manufacturers could possibly do.

If it require two hours to melt the grease and the cocoanut oil, there yet remains ten hours in the day, during each of which it is possible to have a making; and if one hundred pounds of grease are used, the quantity of twenty-five to twenty-eight hundred weight will be finished in the day. But when the grease and cocoanut oil are melted, and the

forms placed one within the other, it does not require an hour to put in and take out a making from the furnace. Let it be understood, that we suppose all the lie ready prepared, at the prescribed degrees, in a larger reservoir.

The next point is, to consider the means whereby the incrusting of the soap prepared in this way can be prevented. It consists in preparing the soap at five degrees more of heat than before indicated; that is to say, the grease should be five degrees warmer, and the lie not colder than before advised. Further, a tenth part of the soda lie must be kept back, and that quantity replaced by as much potash lie without lime, whereby a stronger union is obtained, and the salt neutralized.

That rests on the rule we mentioned, when treating of the making of green soap, that the potash without lime preserves the soap from cold in the winter, and creates warmth in it. It becomes at first clammy and softer than with soda alone; but that defect is lost in the soap, on putting it in the storehouse in cold weather; and if it should be too clammy and soft for some countries, soda lie without lime may be used, or the quantity of potash lie

lessened. A soap made by the cold method, which yields more than two hundred and twenty pounds from one hundred, must be afterwards examined, to ascertain whether it is so strong as to burn the tongue a little on cutting it the fourth day, for the grease is not saturated quickly with the lie, but still absorbs it during the first eight days. After the expiration of these eight days, a soap which has yielded two hundred and thirty to two hundred and forty pounds, must leave no burning on the tongue, whereas a soap producing two hundred and eighty to two hundred and ninety pounds from one hundred, may still retain it a little, since a common soap, without some mordant, would become too soft; but as the mordant (or biting) in the soap is not liked, and at the same time to obtain a produce of two hundred and ninety pounds from one hundred, some measures of lie less can be used, and replaced by as much brine at eighteen degrees, mixed with the last third of the lie. But this method is not advisable for a soap intended for the winter.

During this operation, there is no need of proving, either by pressure or the mordant, as the whole is only a cold mixture, and pos-

sesses no hardness to the touch, which it acquires in the form, in the heating. Proving by the mordant is not advisable, as the lie has not had time to give out its strength, although it may sting the tongue. The only admissible proof is by the spatula, by which it may be known whether the lie will escape from the soap when in the form, which will be the case as long as it flows in the same manner from the spatula. If this is seen, the stirring must be continued strongly, until no more lie runs from the spatula in that state. By this running of the lie we mean, when, on putting some on a board, the lie separates straight from the soap. After waiting some time, if a small quantity escapes, and the soap possesses still its proper firmness, it is then immaterial, and it may be expected that the lie will not separate when in the form; but if the soap is worked too cold, a separation of the lie may be caused by very quick stirring.

When the lie separates from the soap, the heat must be looked to, and if not at thirty degrees, some coal fire must be put underneath, to bring it to a proper heat, for the lie will not easily unite with the soap when less than thirty degrees.

genuine soluble soap, that only practised soap-boilers could distinguish the real from the imitated soap, although filled up with cocoanut oil not unsalted.

To obtain a soap always good, the regular rules for boiling must be the chief consideration, and be strictly observed. To prepare it, the cocoanut oil to be used must previously be made into a firm white cocoanut oil soap, when four hundred pounds of soap are to be made from one hundred of oil. To this one hundred pounds, or two measures of fifty each, there must be added three measures of soda lie, which will weigh one hundred and eighty-seven to one hundred and ninety pounds, and also one hundred and ten of brine at twelve degrees, to harden it, and left from two to three days, to harden properly. When the soap made either from tallow or tallow and palm oil, is in a finished, clear, granulated state, in the boiler, and considered fit to be poured into the form, the cocoanut oil soap, which has become cold, must be dissolved in a vessel, which being done, the grained soap is poured into the form, and cooled to sixty degrees of Réaumur. The cocoanut oil soap, cooled to sixty degrees,

must be poured in, and the two soaps well raked together, and left to settle.

Whilst by this treatment the cocoanut soap gives the fluidity, the tallow grains show themselves in dark places, whereby the mass acquires the exact appearance of a granulated soap. During this operation great attention must be paid not to mix the soap when too warm, for then the cocoanut oil sinks to the bottom and the tallow soap remains on the top; but if on the contrary the two soaps are put in too cold, they become thick directly in the form, and no fine polish will be obtained; therefore it is best to make a trial first with the dipping ladle before making the mixture.

To make this trial two parts of the grained soap and one part cocoanut are stirred together in the ladle. If the soap in the ladle is quite thin, the two are too warm, and if too thick then they are too cold, but when on stirring them in the spoon a finished soluble soap shows itself, it is time to commence mixing without delay.

As a proper proportion, for six cwt. of tallow, one and one-tenth cwt., of cocoanut oil are reckoned, whereby the produce of two pounds

of soap may with certainty be calculated from one pound of grease and cocoanut oil, according to the following calculation :

600 lbs. tallow give 960 lbs. soap,

110 " cocoanut " 440 " "

Total, 1400 lbs.

This soap may be offered to customers with all confidence as granulated soap, for it has all the appearance of such, is equally firm, and answers every purpose in washing to the last degree, and likewise offers the advantage of not depositing lie at the bottom, and all can be cut to the bottom, and lastly, it never crusts, because the tallow soap was unsalted.

As much as two hundred and fifty pounds from one hundred pounds might be made in this manner, but then it could not pass for granulated soap. Also the proportion of lime should be too great, but at the most forty per cent. for a hundred pounds of soda at ninety degrees.

If this soap is to have a reddish tint, the oxyde of iron must be used, and if blue, then green copperas, which is mixed with the grained soap before pouring it into the form. By a greater addition of cocoanut oil, the *proportion* of two hundred and fifty pounds

is to be obtained, but in which case the merchandise is well to be known as not being a granulated soluble soap, even containing so much fluidity. Every soap which is intended to be filled up with cocoanut must not be first smooth, but must, by mixing in the form, become of a rough grain or kernel shape. When the half of whitened palm oil is used with tallow, then a very fine fluidity may be expected; and should the lie deposit at the bottom, then either the salt can be lessened for the cocoanut oil, or more of the cocoanut oil, be taken.

**Making Hard Soap by the hot method without
unsalting.**

We make three kinds of this soap; in the first of which, we have two hundred and twenty, the second, two hundred and sixty, and the third two hundred and ninety pounds, from a hundred pounds of tallow and cocoanut oil, or half tallow and half whitened palm oil. For the soap yielding two hundred and twenty pounds, we use for every measure of grease, one and one sixth of lie at twenty-four degrees, which makes for every measure twenty seven degrees, and harden it with dry salt; for every measure of grease for that

yielding two hundred and sixty degrees, we take one and a third of lie at twenty degrees, and harden it with brine at twenty-five degrees. For the third sort, yielding two hundred and ninety pounds, we use one and a half measures of lie at eighteen degrees, to every measure of grease, and harden it with brine at fifteen degrees. To each three measures of grease, one measure of caustic (corrosive) potash lie, at ten degrees, is given for the first boiling to promote a good union.

With these twenty-seven degrees the soap is sufficiently saturated, or still one-tenth at the most of lie of the same strength may be added, which will increase the strength to twenty-eight degrees. In this case, the soap is mordant, and must be kept hot two hours by a weak fire without being brought to an ebullition, and not warmer than sixty-five degrees. In this space of time, the causticity may be certainly lost, but which should not disappear entirely, and which by the addition of a little weak lie must be recovered, so that on cooling a little pungency may be felt on the tongue. Also, when the lie is duly caustic it can never be used at more than twenty-nine degrees without making the soap *too acid*. Meanwhile, if the soap has not

acquired the necessary hardness, which the application of dry salt or brine failed to do, then these must be added till on the cooling of drops poured on a small porcelain plate the necessary firmness is seen.

In general the soap may be considered hard enough, if when cold on a piece of porcelain or plate, it offers a sufficient resistance to the finger when pressing it, and breaks into small drops without being in a smeary, sticky mass; the soap should not slip from the glass without sticking to it, should have a consistency not only not smeary but brittle, and should leave no humidity in the hand.

If after the cooling the soap shows by the proof that it is still soft, and flexible like leather, it is a sign of an imperfect saturation with salt; if the mordant of lie is not yet present, lie must be added without salt, until the mordant can be tasted, by which the object is often obtained: but should the necessary firmness be wanting, the brine must still be added till there is not only a good pression, but the necessary firmness.

For this method, a fire must be kept up to sixty-five degrees, never higher than seventy of Réaumur, for otherwise, the soap becomes

so liquid by the ebullition that the cocoanut soap sinks to the bottom, and the tallow soap remains on the top, and this happens also, when the soap is too strong of lie, or when there is too much salt. In such a case the fire is put out for an hour, and by the addition of a little cocoanut oil, the soap becomes a paste again, by which the under soap which was too strong will be weakened, and by a good raking will unite again with the soap on the top. As soon as the soap separates it is no longer possible to take out a proof; therefore, before doing so, it must be well raked together. The fire must be left under the furnace for five or six hours, that the lie may give out its strength, and sometimes stirred together, and left in the furnace till the next day or the day after, in order to cool; after which the fire is lighted again to re-heat it.

This leaving to cool and re-heating, is to cause the soap to unite better with the lie, and to produce a harder soap; for we have often found by experience, that a soap thus re-heated is much better than when put into the form the same day; for in that short time the lie cannot unite properly with the grease, and generally the mordant existed in

the soap, without the soap having taken up all the grease. The justice of this assertion is proved, when on heating again the acidulated soap on the following or the second day, the mordant is lost and the soap short of its necessary strength of lie; it must then be prepared afresh, and as much lie given as will leave only a very slight taste of the mordant on the tongue, so that the hardness not yet obtained may be produced by the addition of brine. And on this point, great care must be taken to add the brine very slowly, and each time to stir all well together, to avoid the depositing at the bottom, and the separation of the soap; for that reason, it is better to heat the brine.

If the soap is properly prepared, it will no longer be ropy, and will break short on the spatula, and stretch only the width of two fingers at most. The soap must be left in the boiler to cool to fifty-five of Réaumur, then poured into the form and stirred once in it to obtain an equal and spotless whiteness; but this stirring must cease when the heat has fallen to forty-five degrees, otherwise the lie will separate.

If the soap is to be dyed it must be left in

the furnace till cooled to fifty degrees, and then poured into the form to be still cooled to forty-five or forty-six degrees, on which, a soap already dyed must be raked in with it.

For this purpose, one-tenth of the soap to be dyed is put into a small furnace and heated, and the red or blue colour previously dissolved in water is poured in. But by adding the water the soap does not remain long dyed; some strong brine is to be mixed with it, otherwise the dyed soap will not mix well with the soap in the form.

The dyed soap can be added to the white in three ways; in the form, in the furnace, or in a tub placed near the boiler, in which each time one to one and a half hundred weight can be dyed, and then poured into the forms which should be high. When dyed in the form, the dyed soap is poured on the white, and stirred from the bottom with a crutch bored with holes, and its length increased by an iron handle, and left to cool for cutting.

When dyeing the soap, care must be taken that it is not more than forty-six degrees of heat, and that it is not stirred too much with the colour, otherwise all the soap would be dyed: on the contrary, by stirring too little,

too many places would be without colour ; for dyeing soap, the most suitable forms are three feet wide four feet long and two and a half high, as in the flat form dye is better raked from the bottom, and the soap cools quicker: there is also less danger of its becoming entirely red, and not lively, like the naturally liquid soap. If the boiler only contains a thousand pounds of soap, the dye can be applied to it when properly cooled ; but on account of the certainty of the operation, the forms should be preferred. We have always remarked that a soap put into the form on the day of its boiling was not firm, especially when from two hundred and eighty to three hundred pounds have been made from a hundred pounds ; wherefore we leave this sort to cool in the form, and after four or five days warm it again with one or two measures of brine at five degrees for its solution. If lie is still wanted, it must be given, but the mordant for a warm soap must be avoided, for it takes up no additional strength, the grease having before had time to be saturated. It may then be very confidently expected that the merchandise will be good, and what has been lost in labour will be repaid by a satisfactory and abundant produce. The neces-

sity for this labour does not exist, when half cocoanut and half palm oil are boiled, because the last absorbs the lie quickly. Such a soap can be finished in one day; however, it is better and more advantageous to re-heat it the next day.

A soap of two-thirds palm oil and one-third cocoanut prepared in the same way produces a fine and natural fluidity when the produce is not more than two hundred and forty pounds from a hundred pounds, and at fifty-five or sixty degrees of heat poured into large forms to be cooled.

The same result is obtained in working with tallow and cocoanut, but then fifteen per cent. of oleine or eight per cent. of whale oil must be added, to prevent the cooling too soon, and to gain the necessary time to variegate it.

Palm oil is greatly esteemed for its agreeable sweet odour, and working with palm oil gives the advantage of obtaining a firmer soap than from tallow and cocoanut; further, it cuts with a fine appearance, and is soft and mild in its use.

The manipulation with palm oil does not differ in general from that with tallow and cocoanut oil, only care must be taken not to

charge the soap too strongly with the lye. To prevent these two kinds of soap from encrusting after the last finishing, to every thousand pounds of soap twenty quarts of potash lye at thirty degrees are added; but this must not be done in summer, but only in autumn and winter. When much importance is not attached to the whiteness of the soap, the preference should be always given to palm oil soap. Finally, we cannot recommend palm oil for soap made cold, because spots will appear in it when finished.

Making Soap from Tallow and Soda.

In many fabrics it is the custom to make the soap from tallow and soda without adding potash or oil; and it cannot be denied that a soap perfectly fluid and of a fine appearance is thus obtained: however, its defects are found on using it, being too dry, and giving out no froth.

A soap from tallow boiled with soda only requires an addition which dissolves quicker than dry soap from soda; oil of tallow, whale oil and cocoanut oil can be used. If oil of tallow, it must not be added at the commencement, because it retards the clarifying, but

when the soap is finished,—and we refer to indications given subsequently as to the preparing this oil of tallow;—ten per cent. of whale oil may be added immediately to the tallow; tallow and cocoanut oil can be added when the soap is boiled clear,—potash lie may be added directly, or the last boiling made with lie of potash only.

If it is desired to obtain a smooth, white soap without dark places or liquidity, when it is finished, a solution of potash without lime is made of six to eight degrees, and poured into the boiler, with a sufficient quantity of salt to give it the appearance of being salted soap; then the whole mass is taken from the cooling tub, and poured into it, and left to boil about the width of the hand; then the soap is liquified with weak potash lie till it flows quite thin from the spatula, and the unsalting can only be seen by the lie separating with difficulty. In this state the soap is left in the boiler till the next day, and kept as hot as possible that it may precipitate properly. The next day it may be poured into the form.

When the soap is become quite thin, it is an article quite clear, and is nothing but liqui-

dity. The soap becomes especially very clear when a paste forms upon the salt lie; but this must not be poured into the form, but unsalted and used for coloured soap, for all the dirt which the soap contained, is in this paste, which can be seen by its being not white but quite gray.

When the frothing of an unsalted tallow soap is to be hastened by adding cocoanut oil, it must not be boiled at the same time with the tallow, but later, when the soap is finished, and in the following manner.

The cocoanut oil is prepared apart with the lie, taking three measures of lie at twenty-three degrees for two measures of cocoanut oil. This soap is to be used after two or three days' time.

When the soap is boiled clear in the furnace, the cocoanut soap is to be cut in pieces, and added to the tallow soap in the proportion of ten or fifteen pounds to every hundred pounds of tallow soap, and left to melt without boiling. If a paste forms, it is destroyed by unsalting and uniting the soap. If the soap is to have the appearance of natural fluidity, great care must be taken that it does not become too thin, as the cocoanut oil would render it too liquid.

If a soap made with tallow and cocoanut oil is to be smooth and white, it must be rendered somewhat thinner; at the same time the lie must give out well, without the grain being in the soap. If such a mass, to which above twenty-three per cent. of cocoanut oil has been added, is poured into the form and left to cool, it becomes too soft, and in consequence the iron wire in cutting it will take a slanting direction, and the pieces cut will have an uneven and unsightly appearance, a defect resulting from the soap not having been sufficiently saturated with lie. To rectify this fault the soap in the form is saturated with soda lie at three to four degrees, and for this purpose ten or fifteen pounds of hot lie to one cwt. of soap is poured into the form and the whole well raked together. It is very advantageous to use long, narrow, and low forms to prevent liquid from forming in the soap.

Granulated tallow Soap of natural liquidity.

The tallow soap is first boiled enough to show the round boiled grain (kernel) in the furnace, whereon the soap is to be poured into the cooling tub, or the lie which remains *is drawn off* by tapping it.

The granulated soap being ready boiled, is put into the boiler with as much soda lie at twenty-five degrees, as thirty-three per cent. of tallow, added to cocoanut oil requires. We take the following proportions: to six hundred pounds of tallow, two hundred pounds of cocoanut oil, to saturate which about four hundred pounds of lie are immediately put to the soap: and this is then boiled, the grain being brought by this excess as round as possible. About one hundred and fifty pounds of cocoanut oil are then added, and boiled about half an hour. If the lie has still a taste upon being run off, cocoanut oil must be added until this taste has nearly disappeared; the soap is then finished off into a good hardness.

Another method is as follows.

If the tallow soap, after two or three boilings, is ready and hard enough, it must then boil till no more scum rises on the soap, and until the same floats upon the lie in round pieces about the size of *peas*.

The soap is then run off, with the lie in it, into the cooling vat: as soon as the boiler is empty, for each hundred pounds of soap ten quarts of soda lie of six to eight degrees are

thrown in, and this heated until the lie is nearly at boiling point. To this hot lie the soap is added, and allowed to rise a handbreadth in the boiler. If the soap is then thready and glutinous, salt water of twenty degrees must be added until it is quite thin on the trying board, and only with great difficulty gives off any lie. The cooling vat, meanwhile, must have been cleansed from the former lie, and now the soap and lie are thrown into the vat, so that the superfluous lie may settle. If six hundred pounds of tallow have been reduced to soap, two hundred pounds of cocoanut oil must be put into the boiler and melted, and soda lie of twenty-four degrees, added, until the soap leaves a taste of the lie upon the tongue. When this is the case, sixty pounds to seventy pounds of tallow are added to this two hundred pounds of cocoanut oil, which will again deprive the soap of the taste of the lie. Soda lie of eighteen degrees must now be added, until the taste of the lie returns, and is not lost after half an hour's boiling. Should the taste be lost through this boiling, a little more lie must be added.

When the proper point is arrived at, the fire must be extinguished, and the tallow soap,

which is in the cooling vat, must be added to the cocoanut oil soap in the boiler, and all well stirred together; after it has been left standing an hour in the boiler, it is drawn off into the frames. The frames are then covered with cloths, and left to cool. The soap, upon being cut, will be quite variegated. If this variegation is to be red or blue, the colour must be added to the tallow soap before the latter is mixed with the cocoanut oil soap. This tallow soap remains unmelted in the cocoanut oil soap and forms the coloured veins, whereas the cocoanut oil soap gives the white streaks.

I may here remark, that when the soap is ready it should not remain granulated, but be reduced quite thin with weak lie, to increase the weight of the tallow soap. If there should be, upon cutting, too many white places in the soap, the latter can be run cooler into the frame: should this not avail sufficiently, the tallow soap can, in the grain, like peas, be added to the cocoanut soap, which will produce the desired effect. If tallow should not be added to the cocoanut oil soap, the disadvantage would often arise that the cocoanut oil soap would, in the frame, fall to the

bottom, and the tallow soap remain above. By the addition of tallow, the cocoanut oil is deprived of its excess of weight. A soap in which a deposit is formed is never beautifully variegated, but white on the top, and coloured beneath.

The method just described produces more soap than that wherein the lie is first put, and the cocoanut oil afterwards added. If the cocoanut oil soap is made first, and warmed again, and dressed after it has stood five or six days to cool, there will be an increase in the quantity of soap, and it will be harder upon being cut.

The cause of this is, that by this second warming the albumen and gelatine, contained in the cocoanut oil, are more refined, and require, therefore, an addition of lie, even when by the first boiling the soap was acrid enough.

For the above reasons, we recommend all those who manufacture cocoanut oil soap by the boiling method, not to draw it off into the frame the first day, but only on the second, after having warmed it again and added the necessary lie.

The soap without lie is then poured into the boiler, and fifteen to twenty pounds of *cocoanut* oil added to each hundred pounds

of tallow, which, being melted, the boiling must be recommenced with soda lie. Half of corrosive and half of non-corrosive lie at fifteen degrees must be given till the soap begins to boil into flat plates and becomes a little mordant; then the firmness which is wanted will be obtained by salt. The soap is then to be poured into the form, and left undisturbed.

This soap will be very liquid, and no lie will separate from it in the form. It may be received as a general rule, that when more fluidity is required, it can be obtained by adding oil, oleine or palm oil; on the contrary, too much fluidity can be prevented by adding salt and pouring out when cold.

Another method is the following.

Palm Oil Soap yielding 250 pounds.

Half cocoanut oil and half whitened palm oil are to be used for this soap, with a lie weak in lime, forty pounds to a hundred pounds of soda.

The two oils are boiled with one-third of the lie at ten degrees, and then saturated with the two-thirds of lie at twenty-two to thirty degrees per hundred pounds.

The whole is left to boil two hours, and should no plates (or scales) appear on the soap, lie must be added until they are visible; but the quantum of lie must not exceed thirty-four degrees for a hundred pounds of grease.

The hardness still wanting will be obtained by the addition of salt, and the soap can be poured hot into the form and left there to settle.

The produce can be reckoned beforehand by weighing the lie, and allowing for a boiling of twelve hundred weight a hundred pounds to escape every hour from the commencement of the boiling by evaporation.

Also, if soap is made in this manner with tallow and cocoanut oil, then

50	per cent.	cocoanut oil
40	"	tallow
10	"	oil of tallow

are to be used. If two or three buckets of potash lie at thirty degrees without lime be given as a finish, the liquidity will be thereby much increased.

In the same manner, a soap without fluidity can be prepared with cocoanut oil and palm oil, or tallow: in this case, instead of forty

pounds of lime to a hundred pounds of soda, fifty pounds are requisite, and the soap should be poured into the form not hot, but as cold as possible, and be well stirred together to prevent fluidity by its cooling quickly. The addition of tallow oil must be avoided for this soap.

Method of finishing in an hour any quantity of Oleine
or Tallow oil Soap.

The saponification of tallow, or palm oil oleine for hard soap is attended with the disadvantage of thick lumps forming on pouring in the lie, which can only be dissolved by boiling; but the ebullition causes froth, which must not be suppressed by boiling to clarify, because the vitriol remaining in the oleine would absorb the lime from the lie. In order to obviate this, and to finish oleine soap in an hour, the only method is to apply corrosive soda lie at eighteen degrees.

Should, for example, a thousand pounds or twenty measures of oleine be saponified, twenty-six measures of soda lie at eighteen degrees must be poured into the boiler, and soon brought to boil. The cold tallow oil must be poured into the boiling lie, on which a sort

of grained soap forms, for no grease absorbs the lie quicker than the oleine. When the oleine is poured in, it must be raked among and under the lie, and the boiling kept down as much as possible, otherwise too much froth would be created. As soon as the lie has expended its force to the last, the oil will come to the top, and boil without fire; but that lasts only till the acid contained in the oleine is united to the natron. Oleine must be added as long as the mordant tastes strong on the tongue, but still there must remain a little mordant, as the oil will require strength afterwards. The fire is then put entirely out, and we have a soap as well made as if boiled with several waters. Salt is unnecessary, as this strong lie separates without it.

If the lie after a few hours has lost its strong taste one or two measures more, according to its need, must be added, for the lie must be still a little mordant, otherwise the soap would be too weak. It is then left to settle till the next day, and then poured into the form.

For this soap a filling up of ten or fifteen pounds of soda at eight degrees can be applied in a cold state, which at first concretes in the form, but afterwards passes away.

As the soap thus made cools very slowly, it is not well to use large, high forms, but those of a foot high, without bottom, and placed on well greased flat stones. The soap which is poured on the flat stones, after cooling three days, can be detached from them by means of iron wire. If larger wooden forms are made use of, the cooling often requires fourteen days, and the soap is detached from the sides with great difficulty.

Finally, we will observe, that cocoanut oil cannot be employed for filling up this soap, as the cocoanut soap will deposit; and also, that this soap is preferable for cloth fabrics, where it is employed for milling cloth.

Preparation of Olive Oil Soap in two hours.

To one hundred pounds, or two measures of olive oil, heated to thirty degrees, two measures of soda lie at twenty-two degrees of strength, and twenty degrees of heat, are poured into the boiler, and raked so long together that the mass becomes like a thick broth, which is known by the lie no longer precipitating to the bottom.

This mixture is left in the boiler until the next day, when there will be a firm soap

formed. But as it is necessary to get rid of the lie, a fire must be made under the boiler, by which means the lie will sink to the bottom, and the grained soap will remain on the top.

If, however, for every one hundred and fifty pounds of oil soap, in which no lie remains, twenty-five per cent. of cocoanut oil, and fifteen of tallow, are boiled together to a glutinous soap, and not unsalted, when cooled to fifty or fifty-five degrees Réaumur, and then stirred in among the oil soap, the weight will possibly be increased, without the soap becoming softer, or the cocoanut oil falling to the bottom, and acquires, besides, the good property of giving a better lather.

The salt lie must possess a slight mordant, which, if wanting, is produced by adding a little lie at eight or ten degrees. Should the soap be entirely white, the lie is allowed to run off, and continued with lie at three degrees, and the next day the form is to be filled: when, on the contrary, it is to be of mottled red, as much English red is to be applied as necessary, and poured into the form; then the desired fluidity will be seen.

The method of boiling Tallow Soap, and finishing in two hours.

Tallow soap can be prepared in the same manner, with soda lie, only, on making the fire underneath, pour some buckets of brine at six degrees, that the mass may be fluid at the bottom. When all the soap is melted, it is finished with a weak lie.

It is true that many soap-boilers finish with one water; yet we have many motives for giving the preference to our method, because the grease absorbs the strength of the lie better by mixing cold, during its standing through the night, than when boiled with two waters; for, by the method of finishing soap with one water, the grease has not had sufficient time to unite with the lie; therefore, a good merchandize cannot be obtained, for, even after being cut, the strength of the lie is consumed in the soap, which is changed into an article soft to the touch. There is no further argument necessary to prove that the produce cannot be so good with working with one water as with two.

The tallow can also be raked together with lime, in the cooling tub, and left to stand for

two days. In this case, some buckets of brine are made hot in the boiler, and the soap to be melted added by means of a shovel. It will have, it is true, its just proportion of lie; but it will not have a good consistency, but rather a brittleness, therefore, some weak lie must be given, until the pressure by the hand affords the necessary proofs wanted.

When there is not much froth on the soap, the clarification can be dispensed with, but in other cases must be strictly attended to.

English White Soap.

In England, no more entirely yellow soap is used, but white, which is prepared in the following manner at the manufactory of Messrs. W. Bryant & Co. Plymouth. Into an iron boiler, thirteen feet deep and eleven feet in diameter, one hundred weight of tallow are put, and brought to boil with caustic soda lie of fifteen degrees; when this reaches the stage of saponification, and half the necessary lie is in the boiler, twenty-five to thirty hundred weight of the finest, clearest, resin, which is not darker than amber, is put into the boiling soap in lumps, and soda lie of twenty-two degrees is then added until all the resin

is melted, and the soap is firm enough. If the soap is still in combination with the lie, salt must be added until the lie is entirely separated.

In this state the soap must boil three hours longer, and then the fire be extinguished, and the soap left to stand twenty-four hours so that the lie may separate. The lie is drawn off the next day, and poured out, as no more pungency remains therein.

The soap is again brought to boil, soda lie of twenty-four degrees being added till the soap is quite hard enough, and the lie which separates after three hours boiling has a sharp pungent taste upon the tongue. The fire is now extinguished, and the soap left to stand until the following day, by which time the lie will have sunk to the bottom, and is then again drawn off.

We then put two hundred to two hundred and fifty gallons of water to the soap, which is kept boiling with a slow fire about two hours, after which the fire is extinguished, and the soap left for three days in the boiler, to give time for all impurities to settle to the bottom, the scum rising to the top. The latter is taken off, and the soap then passed into

the frames, and if these are of iron, after two days it may be cut. We have thus a perfectly firm soap, as transparent as the most beautiful amber, not pungent, and of a whitish yellow colour, for which reason it is sold in England under the name of honey soap. If the finest resin has been used, the colour of the soap is whiter than honey, and is of an agreeable sweet scent, from which it derives its name.

If the resin is first purified, according to the process I have described in this work, the soap will be very little yellower than if boiled from tallow alone.

The lie necessary for this soap must be prepared with eighty pounds of lime to a hundred pounds of the best soda.

The froth taken from the soap, as well as the sediment, is then boiled with an addition of salt until it forms a granulated soap, which is then put into the frames, and produces a soap of a darker colour than the better sort.

The lie which was used in the second boiling still possesses alkalic pungency, and can be again employed.

If we operate with a lie that is too weak, we gain no advantage from the addition of

the resin, as the latter becomes then bound with the lie.

English Marine Soap.

To prepare this soap, a hundred and twenty pounds of warm unsalted soap are put to a hundred pounds of pipe clay, dissolved in water to a pulp, to which are added eighty or ninety pounds of calcined potash lie, and the whole boiled till of a proper consistency, upon which it is run into the frames.

Flint Soap.

To one cwt. of calcined and powdered flint four cwt. of soda lie at fifteen degrees are taken, and boiled together, till after three hours, the flint is dissolved in the lie; this mixture is then stirred into the unsalted soap, which is ready, by which an increase in weight is obtained, although the soap will not be transparent.

Bone Soap.

The bones, being ground, are saturated with soda lie of twenty-five or thirty degrees, and left to stand a fortnight, after which the

whole must be boiled till quite dissolved, and the mixture so formed then stirred into the soap. If this addition is to be used to hard soap, soda lie must be applied for the dissolution; if for white soap, potash lie.

Flint, as well as bones, can be added to all soaps which have not afterwards to be separated by salt from the lie.

As I have been requested by many different purchasers of the foregoing work to impart the method of making hard soap without unsalting, by boiling, and to say what weight of lie is necessary thereto, I beg to refer to the following table, with accompanying remarks.

Table for boiled hard Soap.

Tallow.	Cocoa-nut oil.	Palm oil.	Potash lie.	Degr's.	Soda lie.	Degr's.	Salt.	Produce.
No. 1.							lbs.	
66	34	—	50	12	130 140	20	3½	260lbs.
or	34	66						
No. 2.								
—	100	—	180	10	140	20	20	400lbs.

In soap No. 1, when tallow and cocoanut oil are melted together, the potash lie is first

added; when the whole is saponified the boiling is continued with the soda lie. The boiling must be conducted according to the directions given page 141 to 147.

For soap No. 2, of cocoanut oil without an addition of tallow, the boiling must begin with the soda lie. When the proper quantity has boiled away we then continue with the potash lie. The latter is to be added in six equal parts, one sixth at a time, along with one sixth of the salt dissolved in each part of the potash lie. Salt must be added until the soap is hard enough. Cocoanut oil soap must boil an hour and a half to two hours.

If this thin cocoanut oil soap is to be coloured with red streaks, cinnabar must be used, rubbed to a fluid with oil. The soap must be cool in the frame till it begins to thicken, and upon being stirred in the frame, is glutinous upon the stick. If the colouring matter is added too soon, it will form no streaks, but blend with the entire mass, and it is therefore absolutely necessary that care be taken to have it well cooled.

The most unmistakeable proof that the soap is cool enough for colouring, which I have found is this. Upon the newly stirred

soap in the frame I put a table-spoonful of the colouring liquid, which I pour in a long streak; and so long as the colour sinks into the mass, the soap is too warm, and must only be coloured when the colour remains lying on the surface. The colouring matter is then poured on the soap in narrow stripes, then pressed down with the rake, and stirred about cross-wise with an iron rod.

The soaps before mentioned under Nos. 1 and 2 do not easily become rough on the exterior, on account of containing much potash. It is certainly to be recommended to all soap-boilers rather to boil their hard white soap, than to prepare it by the cold method, as the boiled soap is decidedly better.

Beautifully variegated, mottled, and toilet soaps can, however, only be made without fire.

To a hundred pounds of best soda, it is better to use a hundred pounds of lime than a smaller quantity. If soap-fragments, or an entire boiling of this soap is again to be boiled, this must be done with an addition of potash lie of twelve degrees, for if not, the soap by warming will become too hard and rough on the exterior.

To soap No. 1 an addition of twelve to fifteen per cent. of purified resin can be made, whereby the soap will not be deteriorated, but cheaper.

In finishing this work, I will here mention another method of colouring soap, which to many who prepare their soap by the cold method, will be welcome.

To produce in the soap round or square places of a white colour, while the remainder is red, we take an iron plate and have round or square holes the thickness of a finger cut therein; this is laid on the bottom of the frame, and the coloured soap poured out of the boiler. The iron plate is then, by means of four strings, drawn up, and the parts in the soap corresponding to the holes in the plate remain white, and those parts through which the iron was drawn will, upon being cut, be found coloured. In this manner we can produce flowers and all sorts of figures in the soap. The soap for this purpose must, however, be well mixed in the boiler, and possess the property necessary to all soaps prepared by the cold method, of being like a thick gruel.

English Palm Soap unsalted.

To make this soap,
50 per cent. of tallow or whitened palm oil,
30 per cent. yellow palm oil unbleached,
20 per cent. American turpentine, thick
and white, called, by the druggists, common
Tusculan.

This turpentine is that which oozes from the trees and is subjected to no further process. The tallow and palm oil are boiled with a strong soda lie into a grained soap, and in the mean time, the turpentine is saponified in another vessel with soda lie at fifteen, which is added till the turpentine separates and the lie is precipitated. The turpentine soap is then poured through an iron wire sieve, the holes being the size of a straw to stop the fibres of wood. Then the lie is left to deposit, and the turpentine soap taken from the top and poured on the tallow and palm oil soap, on which the mass is boiled with two or three waters to prevent too dull a colour: on finding a good resistance to the hand, it is left to stand without further clarification, the lie run off, and weak soda lie at three degrees added, till the soap flows thin

from the spatula, and the lie separates with difficulty.

The mass is allowed to boil in this thin state a quarter of an hour, the fire taken out, and the soap carefully covered with planks and cloths to keep it warm till the next day.

After this previous treatment there will be found four layers in the soap; the first is froth, which must be taken off; the next will be the polished grained soap, which is poured into the form. The third is the sediment which has precipitated, and which contains all the dirt, and the fourth layer consists of the lie. This mass in the boiler is unsalted, and the soap gained from it mixed with resin soap in those fabrics where it is made.

The soap manufactured in this manner is fine and clear, and is sold by the trade as the best sort of English soap.

A second sort of English palm soap is that which immediately after the boiling is a little fluid, but to which there is not such a quantity of lie given as to precipitate the filth to the bottom. It is true that it is equally good, but it has not such a fine appearance; it is cheaper, because no deposit has taken place, and all the turpentine is in the soap.

The third sort is made like the tallow and cocoanut soap by the hot method, and consists of

25 per cent. yellow palm oil,
25 per cent. whitened palm oil,
50 per cent. cocoanut oil.

The odour of turpentine can be imparted to this soap by adding five to eight per cent. of thick turpentine, but not more, because it would deposit. In every case it must be melted previously, and the fibres of wood cleared from it.

Soap from resin.

It consists of 90 lbs. yellow palm oil,
90 lbs. whitened palm oil,
120 lbs. cocoanut oil,
100 lbs. resin.

The resin is melted with the palm and cocoanut oil together, to which six hundred pounds of soda lie at twenty or twenty-one degrees are added, and the soap is then hardened with salt. If the desired firmness is obtained, it is poured into the form and stirred till the resin cannot deposit. A salted soap can likewise be filled up with resin, but little

advantage will accrue, as the produce is very small, and must be sold at a low price. To obtain this object, the English, in almost all the fabrics, make use of ground flints, stirred with the smooth soap in the form, and sometimes as much as twenty-five per cent. It is quite white, and absorbs much of the water from the soap.

We deliver the soap at seven sixths per cwt.

Common white English tallow Soap.

This sort of soap is not quite hard, and is generally used to soap the linen.

From potash lie and tallow a good and hard-grained soap is made beforehand, and boiled with two or three measures of water, which when finished is poured without lie into the boiler, and seventy pounds of potash lie at three degrees added to every cwt. The whole mass is then boiled to a paste, and very strong brine at twenty-five degrees poured in till the soap is hard once more, and without the lie separating, whereon it is put into the form and cut into measured lengths.

A soap prepared with soda cannot be so treated, as it cannot be filled up, and the lie runs from it too soon.

Manufacture of Toilet Soap.

Under this denomination a soap is classed which is distinguished by its fine appearance, agreeable odour, and the small quantity of lie it contains, from all other household and washing soaps. It is presented to the purchaser enclosed in every sort of envelope embellished to catch the eye, or packed in boxes.

Three sorts of this toilet soap are known; namely, that from pure cocoanut oil, from tallow and cocoanut oil, or from hog's lard: however, these sorts differ from each other, both as to the proportions of lie and the manipulation.

Among all the toilet soaps found generally in commerce at present, that from the cocoanut is most in demand, as cold water is generally made use of for washing. This cocoanut soap froths equally well in cold as in warm water, which is not the case with tallow soap worked with soda. Besides this, cocoanut oil is very suitable for a toilet soap, producing a fine white colour, and when dyed red has a very alluring appearance.

The lie fit for toilet soap must be either made from the purest German soda at ninety-

five degrees of strength, or (which is better for the purpose) from crystallized soda. English soda of eighty to eighty-three degrees, such as is generally found in commerce, is not to be used, as it produces a bad article.

The best soda at ninety-five per cent. comes at present from the Baron von Landsberg Velim's chemical works at Schloss Wocklum, near Iserlohn, and delivered free at Cologne, at $\frac{1}{3}$ per cwt. whereas the English soda at eighty-five per cent. costs $\frac{1}{8}$ per cwt.

When the lie for finer soap is to be made, a hundred pounds of lime are added to a hundred pounds German soda at ninety-five per cent., whereas forty-five pounds lime to a hundred pounds crystallized soda is the general proportion.

The soda is dissolved in the boiler with water, or with a weak lie remaining from a former operation at twenty degrees of strength, and afterwards added to the lime slacked to a state like broth. This mixture must boil two hours and be left to deposit.

The next day, the lie, which probably may be at twelve degrees, must be taken out, and the boiler filled afresh. The lie drawn from the lime and at eight degrees, is poured in

with it to evaporate. By this method a lie is produced at a medium of nine or ten degrees, but it must be evaporated, till according to the lie scales it shows thirty-four degrees. After the cooling it will weigh thirty-six pounds. This evaporation of the lie is to increase its causticity, and to cause all the dirt contained in it to precipitate to the bottom, which can be done in a day if it is sufficiently strong.

The clear lie is then drawn off from the dirty deposit, and put either into vitriol bottles, or into an iron vessel well covered. If vitriol bottles are used, they must be filled with water in which some lime has been dissolved, to take away any acid remaining in the bottle, which would, if this precaution be not taken, absorb much of the causticity of the lie, and this must be done several days before using the bottles. The dirt and deposit from the salt remaining at the bottom after the boiling, can be added to the lime in the weak lie.

We have not made the experiment of using the lie stronger than eleven degrees before the evaporation, as we have learned from France that it must not be stronger than eleven de-

grees. Yet after mature experience it appears to us now that a lie can be obtained quite as good by adding more soda and lime to the lie, and thus increasing the strength to eighteen or twenty degrees, by which the evaporation is spared. In this case more vessels are wanted, which must not be of wood but of iron, because the wood will colour the lie, which must be especially avoided for fine soap, for the only means of obtaining a perfect soap free from defect, is to use none except the finest and whitest lie, and oil or grease of the greatest purity.

If the clearness be an indispensable requisite for this lie, it must be much more so for the oil or grease to be employed, the proportion of which is so much greater than the lie.

The cocoanut oil to be used for this soap must be of the best quality of Ceylon oil, which is dazzling white, of an agreeable odour, and without the slightest acid. If it has a strong odour, then it is a bad oil, and will produce a soap of a strong and disagreeable smell. Before purchasing a considerable quantity, it is better to have some samples from different casks brought in order to choose the best.

For making fine soap, low forms of wood are required, holding seventy-five to eighty pounds of soap, six inches high, two and a half feet long by one and a half in breadth, with a cover of wood exactly fitting the form, so that the soap will be brought to the same level, and nothing be lost by its obliquity; further, a small iron boiler is needed, holding ninety to a hundred pounds of soap, standing on an iron circle with legs, in which boiler the soap can be stirred more conveniently.

Fabrication of purified Coconut Oil Soap.

The oil is poured into a furnace quite clean, and melted with a moderate fire, and left to stand until the following day, that the filth may deposit properly; the clear oil is then drawn off, and fifty pounds of it poured into the stirring boiler. It must then be at thirty degrees of heat, but if colder, a pan with some charcoal must be put underneath until it has thirty degrees of heat. For every pound of cocoa eight and three quarters of lie will be required, making twenty-seven pounds five and a half ounces for the fifty pounds of oil.

This lie must be poured slowly into the oil by one workman, and stirred by another man

as fast as possible during the quarter of an hour which is required for the pouring in. When all the lie is in the furnace, the stirring must be continued till the soap thickens, and the stirring becomes laborious, when it must be worked with the small iron rake, till the soap becomes a thick broth; when on some being taken out with the spatula, there is underneath the thickness of a finger, the soap may be considered as finished, and poured into the form.

If this soap has to possess the transparency so much liked, we place the fire under the boiler, after the soap has become thick and warm it to thirty-four degrees Réaumur, whereby our object will be attained; and the soap will be still more beautiful if not perfumed.

The stirring until the thickening of the soap depends on the previous heat or coldness of the oil; sometimes it takes two or three hours; but if old oil or oil of inferior quality has been used, the thickening takes place quicker, and even before working it the heat should be at forty-nine degrees instead of thirty. If such a soap is stirred one or two hours there will be spots of oil on it which are not entirely got rid of by stirring.

Such a soap cannot be poured into the form, and the only alternative is to bring it into solution again by heating it. The stirring must then be discontinued, and the soap well covered, some coal fire put underneath, till the soap is hot at the bottom, and a paste is formed; then some other soap mixed with it till all is melted; but if the soap should be too soft, and not white enough, two pounds of salt dissolved in warm water must be added, by which the whiteness will be produced, but not so fine as if the best oil had been used.

The soap can be poured into the form in a state of thin fluidity, and it will acquire in it a considerable heat, sometimes as much as fifty to sixty degrees, but this is so far injurious as to give it the appearance of a boiled soap. Also, the lie is so much consumed, that the soap is not only less white, but yellow and clear, and also wanting the requisite firmness, and showing white, liquid spots as in a boiled soap.

Such an article can be cut into squares and enveloped in paper, but must not be pressed, it being too soft and unsightly. If this soap is to be of variegated colour, one and a half ounces of cinnabar must be bruised with oil

into a thin broth, and poured on the soap when finished in small stripes. These red stripes must be raked under the soap with a small iron crutch, with eight holes in it, each an inch large, and raked to the very bottom. By this means the whole mass from the bottom to the top will be in red streaks, and when poured into the form must be stirred first in straight lines, then across, and lastly in circles. If there is too much red, the stripes must be made in a straight direction, then in a serpentine, because a toilet soap does not look well if it has only straight streaks.

Marbling, or as it is termed in the language of the trade "flowering" the soap, only renders it much more attractive.

To marble the soap, a net made of packthread may be made use of, the holes being one half an inch, and put into the form for the soap to pass through, there being two workmen opposite each other, holding it and drawing it up here and there, instead of straight, otherwise the colour would not be equally diffused, and a fine marbling would not be obtained.

The net can also be extended on the top of the empty form, and the soap poured

through it, by which means a good marbling may be obtained; nevertheless, we give an undoubted preference to the other two ways of colouring.

If the soap is to be dyed yellow, some roucou is to be put into some hot cocoanut oil, and boiled for half an hour, on which it becomes a perfect yellow. It is left to stand until the next day, that all the dirt may deposit at the bottom. This dyed cocoanut oil is added to the other cocoanut in the boiler, which will produce a dark yellow, for the addition of the lie will make it lighter; therefore the colour must be given at the commencement.

This can also be streaked with red, and when pressed into an oval shape the pieces have a very fine appearance, and are in great demand. A finer yellow may be obtained by colouring with saffron, and treating in the same manner, but this colour will not bear exposure to the air.

For marbling blue, ultra-marine is best, which must be ground with oil like the cinnabar.

Toilet Soap from Cocoa-nut Oil and Tallow.

To obtain a toilet soap which does not

froth too much, and is fit for shaving, the oil of cocoa and tallow are made use of. For pieces which are to be pressed,

50 lbs. of tallow quite white,

50 lbs. cocoa-nut oil,

are brought to forty degrees of heat, and sixty-four pounds of soda lie and ten potash lie at thirty degrees are added, and stirred until the soap is quite thick, which takes place in three quarters of an hour, on which it is dyed and poured into the form.

If oval shapes are intended, the soap is cut in small pieces which dry in eight days; the form will then give them the oval shape, and the following day under the press they will acquire their shining appearance.

Finest French Toilet Soap.

In France the finest toilet soaps are not made from tallow, but from melted hog's lard, and it is necessary to add the lie in very particular proportions, for the hog's lard will not absorb as much lie as tallow, and the soap will too easily heat and encrust if the lie is given in the same proportions as for any other soap.

For the preparation of this best soap,

75 per cent. hog's lard,

25 per cent. cocoanut oil,

and for every pound of the above, eight ounces of soda lie at thirty-six degrees. These must be at forty degrees of heat before the lye is added, and stirred until it thickens; it is then put into the form, and well covered to keep up the heat, and prevent chinks being formed, which very easily takes place in this kind of soap. Besides, this soap is as free as possible from water, and can be pressed equally well into small tablets as in oval pieces, as it neither crusts nor shrinks in the paper in which it is packed, which, for soap that is to be enveloped, must be taken into consideration. Care must equally be taken, that the soap which is to be pressed is as old as possible, as in that case a much finer gloss is obtained than with fresh soap.

French Toilet soaps for shaving.

The different sorts of soap which we have described are without exception less fit for shaving than those which have been boiled; for that reason they make in France a kind

of soap especially adapted for that purpose, and which is sold there either in paper or in separate pieces, not white nor marbled, but quite red or brown, or gray brown.

Such a soap must be made from tallow and potash lie with three waters, and finished to a good strong pression, when on showing a large grain it is poured into the form, and the intended colour given it; if red, cinnabar; if gray red, solution of gall-nut mixed with cinnabar; if brown, solution of gall-nut with curcuma. These last must be previously boiled in a strong lie and passed through a cloth.

When the soap is cold, it must be perfumed, and the perfume raked well with the soap. This soap has often white spots after being cut, which do not disappear easily.

To obtain pieces regularly alike, the soap is cut small and pounded in a large iron mortar to a paste, which is made into balls of the weight intended for each piece, and after being dried for a day put under the press.

If the soap is not yet compact, and sticks to the forms, a piece of cotton or linen is introduced in the two sides of the form, which

will prevent the sticking, and the soap can be taken out easily. The pieces must be dried for one or two days, and then put under the press, to obtain the proper gloss.

By such a treatment, which is to be recommended for a soap which is to be enveloped in labels, there is no encrusting, but on the contrary such a soap will keep from autumn until spring without showing liquid spots, so liable to be seen in the spring in soap made cold; and this method is only suitable for making it into tablets when it is sold in labels, because those made from pounded soap are not so fine to the eye as those from soap made cold.

Making transparent Soap.

For this soap a small still, such as distillers use, with a cover and a serpent, is wanted. This still with its serpent must stand in another boiler, in which it is heated either with boiling water or by steam, and besides, some tallow soap ready boiled and unsalted is wanted, and some spirit of wine not smelling of bad brandy.

The tallow soap must be cut in small pieces, and put into the boiler with the spirit, in the

proportion of ten of spirit to ten pounds of tallow, and the cover put on, with the serpent communicating through, and carefully pasted round with dough, so that no steam may escape. The fire is then made under the boiler, and the soap with the spirit brought to boil. As soon as the heat is felt in the mass, the spirit will begin to evaporate through the serpent; but as it has to pass through cold water, it will not be the steam which escapes, but the pure spirit, which will flow into a vase placed under the serpent. As soon as this escape of the spirit commences, the heat must be brought on slowly, to prevent a strong ebullition, which would cause the soap to come to the surface and seek to escape through the serpent. If, notwithstanding, the soap still stick to the serpent, there is no other way to obviate it than by pouring hot water through the serpent, but which will certainly stop the boiling.

When ten pounds of spirit have been used, five pounds only must escape through the serpent, and therefore there will be five pounds left with the soap. The soap is then finished, and the cover must be taken off, and the soap poured into a tin chest to cool it. Before it

is cold, a little oil of cinnamon or cloves must be given to perfume it, and if it is to be dyed, some root of alcaña is used for red, and gall-nut for brown.

The next day the soap detaches from the tin chest, and is then to be cut into lengths of one and a half feet, and three and a half inches thick, like the large bricks of soap, and dried in the open air for eight or ten days. It is true that it does not dry altogether, but shrinks in the middle, whilst the edges continue pointed. At the end of ten days it is cut into pieces of the intended weight with iron wire, and these pieces left to cool still another day, and then pressed between two small plates into tablets. If oval shapes are required, as much soap is weighed at once as each requires, and thus placed in the form.

For this kind of soap cocoanut oil must not be used, as it will not produce a fine transparency, neither will tallow soap made with soda be suitable, because when finished such a soap froths badly.

When this transparent soap should be of a clear yellow, there must be no dye added, but it should be left as it is when distilled, suppressing also the oil of cinnamon, which also

gives out colour; only a few drops of aniseed or lavender should be used to perfume it.

Making light frothing Soap.

There are two sorts of frothing soap, one of which is used for the toilet, and the other is called shaving or light almond soap.

This last can be made by drawing off the clear of an unsalted grained soap when boiled enough; but this kind of soap cannot be made where the cold method only is employed. To make this light soap intended as a frothing toilet soap the following way must be pursued.

First, fifty pounds of cocoanut oil are boiled and saturated with seventy-five pounds of lie at twenty degrees; but as such a soap is too soft, it must be hardened with salt, until it resists a good pressure with the hand, and is hard to the touch when poured on a porcelain plate, as before stated.

It is poured into the stirring boiler in this state, and beaten with a wooden fork in the form of a three-pronged dung fork; it must be beaten by plunging the wooden fork into the soap, and drawing it from the bottom to the top, so that in filling up the void thus made

the soap takes the air; this must be continued till it thickens. Some charcoal is then put under the boiler to liquefy the soap, and the stirring continued until the surface is an entire paste, and falls from the spatula in wide tenacious white streaks, and till it reaches the same height in the boiler as before the first stirring commenced. Therefore the height must be marked before the stirring begins.

With this soap, care must be taken to withdraw the fire as soon as it becomes fluid, as the beating (raking) cannot be effected as well when too hot as when it is too cold. When at the proper height it is poured into the form.

The exceeding whiteness of a soap made in this manner gives it an unprepossessing appearance, and therefore it is generally dyed either yellow or red, which is done before drawing off. For dyeing red, cinnabar is used: when it is to be yellow, the cocoanut oil must be coloured before boiling, otherwise the soap would be too soft, if the dyeing is left to the last.

The stirring for a quantity of fifty pounds often takes two or three hours, and is a very laborious operation, and to do it properly will cause copious perspiration.

Light Almond Shaving Soap.

For this soap, there is required one already made and unsalted, and composed of potash and tallow, or of soda with two-thirds tallow and one-third cocoanut oil; also a little iron boiler which can be heated underneath; also another boiler or tub in which the soap can be stirred with the unsalted finished soap; a rod two feet long, made of twelve willow twigs, such as the basket makers use, bound together; and lastly, a flat spoon.

As soon as the grained soap is ready, two buckets of water for making a hundred pounds of light almond soap must be brought to boil, and two pounds of finished hot grained soap must be poured into it, and the mass beaten with the aforesaid rod (or whisk) till a froth is formed like that at the commencement of washing. When this froth mounts four or five inches, a second workman pours the grained soap into the empty boiler or tub, and the froth is taken from the other and added to it, taking care to add only the froth which is to be mixed with the grained soap, and raked with great force. After having taken off the froth, the beating (or whisking) must

commence again, and the froth again poured into the grained soap, and still stirred until the soap becomes light enough, which is known when the frothy soap occupies three times the space it did at the first as the grained soap.

When beating the froth, attention must be paid that the water does not become too thick, which happens when too much soap is put into the water, and which produces a gluey soap that will not froth. This can only be prevented by adding some water. Neither should there be too little soap in the water, for the froth would not be durable, and would dissolve at once in the soap.

This operation will be the easier if we take for beating, a soap made from cocoanut oil alone, as this forms a lather in a much shorter time.

To dye this light almond soap red, some cinnabar must be used; for yellow, some roucou, and when it should be very fine, some saffron, and these colours raked well into the soap.

To perfume the best sort of white almond soap, the oil of lavender, bergamotte and a little oil of cinnamon, for that which is dyed red, two parts oil of cinnamon, and one part

oil of cloves, and for that dyed yellow, oil of orange, or of lemon with a little oil of cinnamon.

This method of making this light soap is that which costs the least trouble, and is attended with the advantage of never burning at the bottom. By this method it can be made from cocoanut only, but in that case, it must be boiled with soda lie at thirty degrees and unsalted, and for every pound of cocoanut oil, three-quarters of a pound of lime will be wanted. It can also be worked with weaker lie, but then a quantity of salt out of proportion will be wanted to harden it.

This light soap, after being cut, must be dried properly; if the pieces are to be enveloped in paper, they must be cut larger than they are eventually to be, and placed on a net spread on the floor of a bed-chamber, from which they must be taken after eight or ten days and planed on a wide fixed plane, moistened on the surface, and the blade projecting from it; they are then to be marked and be enveloped in paper.

There are some soap-boilers who, to keep this light soap thin, add spirit of wine when beating it, but we do not approve of that

method, as the spirit gives a bad smell to the soap; and in the soap from cocoanut it is even insupportable.

Pumice stone Soap.

It is prepared from light finished beaten soap, with an addition of one-sixth pulverized sifted pumice stone. It is very agreeable in water, and of excellent quality, without affecting the skin in any way whatever.

Sand Soap.

To a soap from tallow and cocoanut oil, boiled to a paste, and when hot, twenty-five of sand are added to each hundred pounds of soap; but the sand must be left to cool. This soap is dyed brown, and sold in pieces as a soap for washing the hands.

Bitter Almond Soap.

This soap is made in the cold manner, and if to be sold in lengths, the proportions must resemble those of the Windsor soap. For the pressed pieces, three parts hog's lard and one part cocoanut oil with eight ounces of lie of soda, thirty-six ounces are wanted for every .

pound of grease. When the before mentioned signs show that the soap is finished, the perfume is added, viz., to every thirty pounds of soap three ounces of bitter almonds and one ounce of oil of lavender. As the oil of almonds which costs one shilling per ounce is a strong poison, great care must be taken in using it.

When this is divided, the pieces must be enveloped immediately in paper, and securely, or the odour will be lost. Tin leaves are best adapted for enveloping this soap.

A second sort of bitter Almond Soap.

This soap is made according to the rules observed in making Windsor soap, and one half perfumed with oil of cinnamon, and the other half with oil of cloves, which will give the soap the smell of almond soap; but as these oils colour at the same time, it is not possible to obtain a white soap, as it becomes a clear yellow. Therefore it is dyed with a little yellow or red when in the boiler, and a very saleable article is produced.

Brown Windsor Soap.

Under this name, there is a soap well known in commerce, and much esteemed for its durability and fine odour, but which is not made by the cold system, like the other toilet soaps, but by boiling and unsalting with grained soap, or from the shavings of perfumed soap, to which only one third of cocoanut oil and two thirds tallow are added. If prepared from grained soap, from eighty to a hundred pounds of the clear of a boiled grain soap must be drawn off, and poured into a small furnace, and thinned with some water, and dyed brown with the proper dye. Care must be taken to stir it well till the soap thickens in the form, to prevent the appearance of white streaks. For that reason, a soap well prepared can only be made use of for this purpose.

If Windsor soap is to be made from shavings, they must first be melted and salt added till the soap separates from the lie, and a good grain appears. The dye is then applied, and the soap poured into the form, and stirred until cold, when it is to be perfumed.

For the perfume, two-thirds oil of cinnamon

and one-third oil of cloves are used, to which a little tincture of musk can be added. This tincture is to be bought at every druggist's ready prepared, but any one can make it by pouring a little spirit on some musk. The cheapest way is to buy the shrivelled pods of musk, and when cut in small pieces, steeped in spirit for a fortnight, which will communicate the odour to it. Much soap perfumed by this method is found in commerce, and the Jews especially are ready customers for it.

Examination of the Soap to discover from what grease it is made.

We have before had occasion to remark that all the hard soaps are prepared from tallow, palm oil, and cocoanut oil, and all the soft soaps from common oil, or whale oil.

Although it is not possible to determine the precise quantities of the ingredients employed in the manufacture of the diverse kinds of soap, yet our experience will enable us to find the quantity of stearine, and also by the smell of the soap, to indicate to every soap-boiler the nearest proportions of the grease which have been employed.

Our experiments are chiefly founded on the

quick or slow cooling of the grease when separated from the lie; and the knowledge of the degree of cold at which the different sorts of grease congeal.

For such an examination it is necessary to separate the lie from the grease, and thus restore the grease to its primitive state. This is effected by weighing half a pound or a pound of soap, and cutting it in small pieces, and melting it slowly in the same weight of water. To this solution, some sulphuric acid at sixty-five degrees is added till the soap is separated, when the greasy substances employed will be found on the top, and the lie and the sulphuric acid at the bottom. The clear grease on the surface must be taken off, and washed several times with water previously acidulated to six degrees, in order to destroy the last vestiges of the lie, after which, the grease employed in the soap is restored to its first state before being saponified.

Although the smell and the colour will indicate the sort of grease employed in the soap, yet it is still desirable to know the exact proportions which have been used.

For that purpose, the quick or slow cooling of the grease must be proved in a glass in

which the thermometer of Beaumé is to be placed.

If the grease becomes thick and troubled at thirty-two degrees of heat, the grease used was tallow; if at twenty-eight degrees half tallow, and the other half cocoanut oil; at eighteen, cocoanut oil only; and lastly at six degrees, olive oil only.

In examining black soap, if it has been made of whale oil only, the grease will congeal at four degrees; on the contrary, if it thickens at five degrees, linseed oil or hempseed oil must have been employed. If resin has been used for soft soap, it will unite with the vitriol, and thick black flakes will be formed.

And further by this method of solution, not only the sorts of greases are discoverable, but also the goodness of the soap and its constituent parts can be ascertained. The goodness of soap consists in the largest quantity of grease saturated with lie, and to form a judgment of this goodness, the grease is left to cool on the vitriol employed for the solution, and is weighed; and, therefore, supposing half a pound or a pound of soap has been employed for the solution, the quantity

of grease it has produced will form a scale by which it can be calculated how much soap has been made from a hundred pounds of grease.

By the same method, it can be discovered, if other substances, such as flints or flour, have been mixed with the soap, for the first will precipitate to the bottom, and the last will be detected by a milky agitation.

Examination of a Soap whether it will crust.

We have before mentioned that a hard soap, either from adding too much water or from imperfect manipulation or using bad soda, will easily form crusts, which render it unsaleable; we therefore think it our duty to indicate the signs by which it may be known whether a soap will keep or not. As only a soap which is overcharged with lie will form crusts in the hot days, and it being in winter generally that they are seen, we bring the soap to an artificial degree of cold; and which is effected by obtaining a cold below the freezing point by means of Glauber salts and muriatic acid.

For this purpose, a flat earthen pot and a half pint white glass bottle with a mouth an

inch to an inch and a half in diameter. The bottle stands on a plate of iron in the pot, and the piece of soap to be proved is put inside the bottle. At the same time a small thermometer is introduced into the bottle, and the mouth covered as carefully as possible with a cold and wetted piece of linen. Some Glauber salts are then put round the bottle, and some muriatic acid poured on them, which will cause the bottle to be surrounded with a cold of eight to ten degrees, and the soap inside exposed to a test of the frost. However, the cold on the inside will not be at the same degree as on the outside, as the warm air in the bottle will decrease it.

It is necessary that the thermometer in the bottle should mark below the freezing point, and remain there one or two hours, i. e., that the cold round the bottle should never rise above the freezing point; for if at the commencement the mixture showed eight or ten degrees of cold, the influence of the air would diminish the cold in half an hour. As long as there is any Glauber salts not dissolved, they must be stirred to increase the cold; but when that is without effect, the acidulated mixture must be taken out of the pot, and

fresh Glauber salts and muriatic acid put round the bottle, until the cold has penetrated sufficiently; it is then left till the next day, when the soap may be taken out of the bottle. If the soap is not found covered with salt crusts, one may reckon with great certainty on the good quality of the soap being preserved even in the coldest weather.

It is not the practice to cork the bottle, because it produces heat, and will prevent the creation of cold, and from that motive also the bottle is placed on the plate of iron, that no warmth may be communicated to its contents either from the bottom or the top.

Melting Tallow with Acid.

When tallow is to be used, as a best candle tallow, it must be previously cleaned from all the blood it contains, for it is that which gives the gray colour to melted tallow.

For this purpose, the soap is to be cut in small pieces, and put into a tub which has a tap at the bottom. When it is two-thirds filled with tallow, there must be sufficient water pumped in to wash the tallow well, and with it one and a half measures of potash

lie at fifteen degrees to every hundred pounds of tallow; the whole must be well stirred together, and left till the next day.

The red thick water thus produced must be let run off, and the tallow, after an hour, must be again washed with fresh water. The tallow is then poured into the melting vessel, and, to every hundred pounds, half a bucket of water acidulated with three-fourths sulphuric acid must be thrown on it, upon which the melting may commence either by steam or fire in a copper boiler or in a tub.

As soon as melted tallow appears on the surface it must be taken off, without having been boiled with the lumps, for tallow melted with acid when boiled with lumps is much worse than that taken off before a strong ebullition.

When all the tallow is drawn off, without having come to a boiling in consequence of the weak fire being kept up, a bucket of water with one-half sulphuric acid mixed with it to every hundred pounds of tallow is to be poured on the lumps. This mixture must boil an hour, when the lumps being sufficiently corroded, the tallow will be disengaged. Then to every hundred pounds of

run out. The remaining tallow in the tub is dry, with cells like those of a honey-comb. This tallow is melted and used for lights, which can be drawn cold from the forms in summer.

The tallow oil we have above described is a profitable article for making white soap.

Manufacture of transparent candles and oil of camphine.

The manufacture of transparent tallow candles exactly resembling those of spermaceti has been kept in the greatest secrecy until the present time most carefully, and many transparent candles have been sold as spermaceti, which were made of nothing but tallow. As the making of camphine oil can be combined with the manufacture of transparent candles, we will treat of these two subjects minutely. The tallow for this said transparent article must be melted, and every hundred pounds mixed with sixty pounds of oil of turpentine, and the mass poured into a cask (or tub) which must have eight or ten tap holes bored, and closed with taps higher than the cask, as before mentioned, when describing the cooling cask.

The tallow must be covered hermetically, and left so during six or eight days, to give time for stearine to form, which may be ascertained by the appearance of hard pieces in the tallow encompassed with oil.

When these are seen, the taps must be drawn out high enough to permit the drops to run into a cask placed beneath, and this is to be continued till all the oil has escaped, leaving the tallow in the cask not yet compact.

This tallow is then put into horse hair bags used in stearine presses, and placed under an hydraulic press, by which all the oil remaining will be slowly pressed out, so that only the cakes of stearine remain, which must be cut in small pieces and boiled with a like quantity of water for two hours, that the smell of the remaining turpentine oil may escape; then the tallow may be drawn off, and poured into the moulds for stearine candles.

The plaited wicks are used for these candles like the stearine, and should the smell of turpentine still remain, it will be lost very soon when exposed to the air.

From a hundred pounds of tallow, forty-five to fifty pounds of candles are obtained;

the rest consists of tallow and turpentine oil mixed together, which in that state being useless for any purpose, must be separated by pouring it with an equal quantity of water into an alembic with the serpent and cooler such as the distillers use, the serpent fitting closely in the alembic; the heating must commence underneath. As soon as it begins to boil the water will evaporate with the turpentine, and by cooling in the serpent will fall into the before mentioned cask as oil of turpentine and water. The oil which swims on the surface must be taken off, and the water minutely weighed to see how much has evaporated from the alembic, for as it amounted to half of the primitive quantum there must be some fresh water poured into the boiler immediately.

The boiling must be continued till the liquid flowing from the serpent contains no more turpentine, which is easily discovered in a glass, because the oil will swim on the top. The cover is then taken off, and the tallow in the alembic being freed from turpentine can be used for soap. When the operation is finished, there will be a loss of eight per cent. on the turpentine, but the candles

will be much finer, and not dearer than the stearine, as the acid and working the lime have been saved.

The oil of turpentine can be used in another boiling; however, it is more advantageous to apply it as oil of camphine to burn in lamps made expressly for it, it giving a light equal to gas, and without smoke or smell. When thus used, it is purified once more by distilling it afresh, and by adding to every cwt. three pounds of unslacked lime with seventy-five pounds of water; the lime will slack to a broth. The distillation continues till the turpentine begins to turn yellow, when it must cease, as these are the resinous matters which must not enter into the camphine. This white purified oil must be kept in bottles well stopped for use, which must not be delayed longer than a month, else it will become thick and must be distilled afresh.

Melting soap by Evrard's method.

This method consists in first breaking the tallow in small pieces: supposing, for example, three hundred pounds, which are put into the boiler, and at the same time, two quarts of corrosive soda lie at twenty degrees thinned

in two hundred pounds of water must be poured in and brought to boil together. The strength of the alkali lessive and the action of the fire will cause the greasy contexture to swell, and the greasy substances to separate and rise to the surface, from which they are taken off and then washed with warm water, and in seven or eight hours will liquefy, and become quite clear. From this operation, which is done in open vases, no other smell proceeds than that from a boiling of a meat soup, which can in no way annoy the neighbours of a soap-boiling establishment.

The soap thus obtained keeps a long time without becoming rancid, and has no smell that can be remarked, or in any case disagreeable, and is quite different from common tallow. The tallow obtained by this method from veal or mutton or pork is quite white, whilst the tallow from beef soon takes a yellow tint, which is soon lost in making the lights.

It is precisely this white colour, with the total absence of all smell that renders the employ of this grease so advantageous in the manufacture of pomade and perfumeries, and as a covering for preserved meats, and espe-

cially, on account of its hardness for making candles. The grease made in this manner can also be used for pastry, especially that from calves and swine, and without imparting the least disagreeable taste or odour.

The superior quality of this grease can be easily accounted for, inasmuch as the common tallow and greases receive their peculiar smell from the fat and liquid acids which the bodies of all animals contain, whilst in Evrard's method of washing the tallow lumps with a solution of alkali, the grease by those means is freed from the acid it contained.

We may be convinced of the justice of these assertions by adding an acid, sulphuric acid for example, to the alkaline solution thus employed for melting the tallow, when a mass of grease will separate which will partake of the smell of the animal to which it belonged. On that account it is called flesh fat. Whilst this fat contains those stinking and a multitude of other acids, it deteriorates this tallow one-quarter to one-half per cent.; for whilst these stinking and other acids are contained in it, the greasy substances cannot be thoroughly saponified by the alkaline lie, which resists the saponification a long time, and the

change does not take place even when heated with a solution of carbonic natron at ten to twenty degrees of Beaumé. It is only later that it is fit for saponifying, especially when it is mixed with a little rancid grease or some greasy substance which saponifies easily.

The scientific proof of this method is made known as an essential improvement in this branch of industry, inasmuch as it is in no way injurious to the health, nor disagreeable to the neighbourhood, nor accompanied with any danger from fire, and also requires an apparatus much less expensive than melting by means of acids; for it can be done in vessels of plate iron, cast iron, or zinc, and is not injured by the changing thinning lie; and, moreover, cleaner and better tallow is obtained by this method.

We have tried this mode of melting, but on account of the long boiling necessary, which produces much froth, we have not discovered the superior advantages to the other manner of melting.

If the grease is not disengaged from the lumps after the tallow has boiled two hours, it is only to be effected by the addition of half a pound of sulphuric acid to each hundred pounds of tallow.

The best manner of melting tallow is, after all, the ancient one of cutting the tallow in small pieces and boiled without water in an iron boiler till it is clear, and begins to froth. Then it can be drawn off, and so continue till the tallow is out of the boiler. The lumps can then be roasted hard and pressed.

The candles moulded from this tallow are not so white as those made from tallow melted with acid, but the quality is much better, retaining its natural hardness, which is considerably lost by melting with acid. Therefore the employment of tallow melted with acid for making candles intended for the summer should be avoided as much as possible.

If a means of hardening tallow for melting for candles in summer is required, the litharge of silver is to be recommended, it is dissolved in water, and a half added to every hundred. We have made use of it at eighteen degrees of heat, and have been able an hour after to draw the candles.

Important invention of Braconot's.

**A very simple method of making artificial Wax
75 per cent. cheaper than Natural Wax.**

Any animal grease or tallow is liquified by oil of turpentine, and poured into small round boxes lined with felt in the inside, with a number of small holes bored in the sides and the bottom. From these little boxes the liquid is pressed out gradually, but sufficiently to get rid of the turpentine oil and all the fluidity. The firm mass remaining must be washed a long time in water, to take away the smell of the oil of turpentine, and afterwards kept in a fluid for several hours with animal coal freshly prepared and filtered whilst boiling. When cooled, it is a substance beautifully white, half transparent, dry, brittle, and free from taste or smell, which will mix well with chlorine or muriatic acid, or with one-fifth of wax to give it the necessary suppleness. In this state the mass can be made into candles not to be distinguished from wax lights. The turpentine is separated from the other oil, and pressed out by means of distillation; and this oil when purified and whitened with animal coal

is of excellent service in the preparation of a soap extremely well adapted for the trade and for household purposes. This animal oil when saponified with potash and then by means of the sulphuric acidulated soda often contained in the mother lie, can be changed into a hard soda soap. There is also a sulphate of potash much in demand in the alum works to be obtained from it.

Davidson's cheap process of rendering the most fetid whale Oil completely inodorous and fit to burn in Lamps.

This cheap method of purification consists in the employ of chloride of lime, the quantity depending on the degree of putrefaction of the whale oil. In general one pound is sufficient for a hundred and twelve pounds of oil; but if it is in a state of great putrefaction, then there may be one and a half or two pounds required. With one pound of chloride of lime, about twelve times the quantity of water must be employed. The chloride is bruised in a mortar, and the water added by degrees till it forms a soft and liquid paste, and afterwards by the addition of the remainder of the water it takes the consistency

of cream. This is to be mixed with the oil, and often carefully stirred. After some hours one pound of sulphuric acid previously diluted with from twenty to thirty parts of water is poured on the mixture, and the whole brought to boil with a moderate fire, and stirred continually, till drops of oil run off at the end of the stirring pole. It is then left for some hours for the oil to precipitate, and the acidulated water to be drawn off. A common cast iron boiler with sheets of lead at the bottom is the best adapted for this purpose, and likewise a copper or iron vessel may be used when the quantity of acid is not too great. The chloride of lime must not be bruised in a copper or iron mortar.

Preparation of Pomades and Oils for the Hair.

Pomade is made with four parts of hog's lard and one part of tallow during the summer, but in winter with hog's lard only, which is melted whilst fresh and mixed with sufficient water to take away the smell.

There are two sorts of pomade, the light and the heavy.

The light pomades are those which become frothy in rubbing them when cold, thereby

producing a larger volume in proportion. For this purpose four parts of grease are put into a flat pot, and when a little warmed kneaded with a piece of wood, and afterwards beaten till it becomes quite soft and swelled, so as to appear twice the bulk of the first quantity, which arises from the bubbles caused by the beating. This light pomade is then coloured and perfumed.

The pomade is generally perfumed with oil of bergamot, orange, and some drops of cinnamon oil or cloves; the *pomade a la rose*, with oil of roses, and that of vanilla, with the extract of vanilla. But as there is a great demand for an immense diversity of perfumes, they must be composed according to the taste of customers.

The pomade is dyed red with cinnabar; yellow with Roucou or saffron; vanilla and quinquina will give the pomade a brown colour and a very agreeable smell. For five pounds of pomade one-sixteenth of an ounce of oil of roses which costs two shillings is sufficient.

The light pomades, from their large mass, and little weight, are very profitable for the retail trade; but are not to be recommended for putting into small pots or bottles on ac-

count of their shrinking after a short time; the heavy pomades are preferred for that purpose, which are prepared by melting the grease, and perfuming and dyeing when thick, and are then put into the pots.

Pomade for colouring the hair (cosmetic.)

This pomade, called also cosmetic, is formed in tin tubes of the length and size of the pieces intended to be sold. A mixture of two parts of tallow and one part wax is made, then perfumed and dyed. Ivory black is employed to dye the black; the brown is made from a little cinnabar added to the ivory black; and for the blonde, cinnabar only. In every case the mixture must not be poured in too hot, or the colour will precipitate.

This pomade is used in sticks to colour and smooth the hair. The bandoline to strengthen the hair is prepared by boiling the kernels of quinces, which contain that gluey substance.

Preparation of Soap to be used in the cloth Manufactories, Dyeing, Washing and Spinning Establishments.

In preparing all soaps intended for the use of the above mentioned establishments, great care is indispensably necessary in giving the lie its proper proportion of strength, for if the lie be too weak, the stuffs cannot be properly cleansed, and also a greasy matter is communicated to them, which in every case is very injurious; on the contrary, if the lie is too strong in the soap, the stuffs are then scoured too much, and retain always a dry stiffness, which should be specially avoided.

When the cloth is scoured or milled, it is the rule to use a soap of a quality corresponding with that of the stuffs, for it is proved by experience, that a cloth which is really good, and which is called stout cloth, must be milled a longer time than the Zephyr, or the light stuffs for pantaloons, which only require to be washed, else they would lose the elasticity which is indispensable to them.

In executing an order for soap for milling, the maker should direct his attention to ascertain whether the process of milling was according to the ancient manner by stocks,

or the new method by cylinders. By the first method the milling requires longer time, and the employ of a soap which does not dissolve too quickly, whilst by the latter method, a soap is wanted which does not congeal too quickly.

Among the soaps which do not dissolve quickly, we reckon those which are prepared from tallow, or palm oil with soda lie, from which it is afterwards separated.

A soap which dissolves the quickest, is that which has been boiled from olive oil, with an addition of tallow, then some oleine soap, in a word, the economic soap. It is, however, true, that green or brown soap always dissolves the quickest; nevertheless, it is not fit for milling heavy cloth with the stocks, because on that account, they do not thicken sufficiently.

Although the manufacturers of cloth will not easily decide on using any other sort of soap, yet the soap-boiler should not be led away by the opinion, that every maker of the same article can make use of the same sort of soap, because, as we have already observed, not only the different qualities of cloth and the method employed in their manufacture

should be taken into consideration, but also the different properties of the water used.

It is therefore the duty of every soap-boiler to supply each manufacturer with the kind of soap which in that manufacturer's own opinion is the best adapted for his purpose and for the quality of his material: we will for that reason describe more fully the preparation of the different sorts of soap.

Hard and unsalted soap for milling cloths of superior quality.

This kind of soap is made either of tallow, or cocoanut oil, or whitened palm oil with an addition of cocoanut oil, and in the following manner.

The palm oil or the tallow should be boiled into a firm, grained soap, with a corrosive soda lie, which is added till the soap shows a strong grain, and bears a good pressure of the hand, and the proof shows a sufficient firmness when cool, and when the lie, which still remains unsalted in the soap, leaves a sharpish taste on the tongue. We have then a soap, it is true, but it is not yet fit for milling, because it does not yet possess a sufficient scouring quality, and therefore will not cleanse the cloth from its dirt, glue, and grease. To

give the soap the necessary power to effect that purpose, an addition of cocoanut oil is requisite, and for that reason, the unsalted lie which remains in the soap must be got rid of, and the soap poured again into the boiler, but without any lie. For every hundred pounds of palm oil or tallow used for this soap, twenty-five pounds of cocoanut oil must be added, which is mixed with the soap when cold in small quantities, or, which is more advisable, when in a state of solution, and then made to boil afresh; when it is intended to make a soap of a superior quality, and to diminish the lie, in order to saponify cocoanut oil, a corrosive lie of soda of twenty-eight to thirty degrees is required. The lie is added till the soap has acquired a good firmness, and when proved, a taste rather strong of lie remains on the tongue. As soon as this is found, then the soap must be let boil half an hour to ascertain whether the same taste yet remains; if not, a little more lie must be added, till the taste returns. When the soap is not yet separated from the lie, to effect that purpose, some salt must be used, and continued till the soap on the spatula separates from the lie. The soap will

remain some hours in the boiler to cool, and be afterwards poured into the form.

When it is desired to obtain a larger produce, although with the conviction that the quality will not be so good, instead of a lie at twenty-eight to thirty degrees for the saturation of the cocoanut oil, one at twenty-two to twenty-four degrees must be used, and the soap poured into the form in a state of paste, and not unsalted; but in this case, care must be taken that the soap is not brought to a higher degree of heat than twenty-five Réaumur, otherwise the soap from the cocoanut oil would stick to the bottom of the boiler.

A soap of this kind in which the salt lie still remains, is not however of such good quality as that which has been unsalted, because every soap containing that salt lie, which is used for milling, renders the cloth much harder than any other better soap.

The addition of resin, is still more prejudicial; or when the soap has been prepared with a soda lie to mordant, in both which cases, the cloth acquires a hard harsh feel, such as that which is found on a material made from a coarse wool.

This sort of unsalted soap made from tal-

low and palm oil, was much used at that period when stocks were employed for milling cloth; but for the last five years, the cylinders have been almost universally substituted, and therefore this soap has been entirely laid aside; for although the large and hard pieces of soap dissolved into the cloth under the stocks, yet they could not be broken by the cylinders without injuring in those places where the soap was pressed.

Olive oil Soap for milling Cloth.

The soap used under this name for the above purpose, is not prepared from olive oil only, but also of

60 per cent. of olive oil,

20 " tallow,

20 " cocoanut oil.

The olive oil and the tallow are heated in the boiler to thirty degrees Réaumur, and as many buckets of cold and corrosive soda lie at twenty-three degrees are stirred in till the mass becomes an entire broth like a soap prepared cold. Then the mixture must rest one or two days in the boiler, that all the lie may combine perfectly with the oil. At the expi-

ration of that time, a fire is lighted under the soap, on which the lie will become separated. When the mass is well heated, and after it has boiled half an hour, the fire is taken out, and the soap is then cleared from the lie, which is drawn away from the bottom. The soap is then poured again into the boiler, and the before mentioned twenty pounds of purified cocoanut oil are then added, and the fire again lighted. The soap will then immediately concrete, and become gelatinous. If it is wished that the soap should become entirely white, then soda lie at fifteen degrees must be used for saturation until a taste of the lie is felt on the tongue, by which we know that all the grease is saturated. Then the soap is left for two days in the boiler to become cool and clarified, after which, the brown dirt and whatever lie may remain must be taken away, and the soap then poured into the form.

A soap prepared in this manner is not so firm as if no cocoanut oil had been used: however, to give it the necessary firmness, ten pounds of soda dissolved without lime must be mixed with it in the form; by which means the greasy matter is taken away, and sufficient firmness obtained. By such a method

we have a soap, all the dirt of which is deposited at the bottom of the boiler, leaving the soap clear. The grounds of lie and also the parings can be used in the oil soaps of different colours.

If it is intended to make a mottled soap, then when the cocoanut oil is brought to a state of finished oil soap, it must be saturated with a lie of twenty-two or twenty-four degrees, instead of fifteen degrees, in order that the soap may become a round grain. When it has acquired a taste of lie, then salt must be added till a round grain is formed, after which, the red or blue colour dissolved in water is poured in, and then a coloured soap white and speckled will be found in the form.

We will make this last observation, that care must be taken not to pour the soap too hot or too thin into the form, otherwise there will be too many white places.

Olive oil Soap of a second quality, to be used in
manufacturing Cloth.

It is prepared with

50	per cent.	olive oil,
20	"	tallow,
30	"	cocoanut oil.

The olive oil and the tallow are brought to a proper boil in the manner before indicated in the former article, and the lie then separated from the soap. The soap is then poured into the boiler, and the purified coconut oil added. For each kilogramme of coconut oil, the same quantity of potash lie at twenty-five degrees (which must not contain much lime,) must be used, and the whole boiled an hour together. But the soap being not yet strong enough of lie, a solution of soda without lime at twenty-five degrees must be added during the ebullition, till the soap acquires a strong taste of lie on the tongue, when the addition of lie must directly cease.

The soap is then left to repose in the boiler until it is cooled to forty-five degrees of Réaumur, and is then hardened with brine at thirty degrees, which must be added slowly, till the soap is no longer slimy and soft, but very short and firm. We know that it has attained the necessary firmness, when on pouring a few drops on a porcelain plate, it shows, after cooling, the required firmness. We must not begin to add the salt whilst the soap is still too hot, otherwise the lie becomes separated, and the soap then is as dear

as if unsalted. As soon as the soap becomes short, the salt must be added slowly with the utmost precaution. When the soap becomes too short, and appears disposed to separate from the lie, then for every quintal of oil, one or two pounds of glue must be taken and boiled in water to the thick state in which it is used by the cabinet makers, to which six times the quantity of finished soap must be added, and the whole made to boil properly together and well raked. This mass must then be raked into the finished soap in the boiler, after which the lie will no longer deposit itself. For such a white olive oil soap in which the lie is to be left, it is indispensably necessary to use low and narrow forms that the soap may cool as quickly as possible.

Oleine Soap for manufacturing Cloth.

Having already described the fabrication of this soap, we will refer simply to the communications before made on this subject, and which will be found in their proper place.

Economic Soap for manufacturing Cloth.

The use of this soap has been known for a number of years in the French manufactories,

and to which must be essentially attributed the excellence of those fine elastic articles for pantaloons, for the manufacture of which France has been distinguished for a long time, and has obtained a superiority over Germany. The cause of such well earned success may be attributed to this soap, which is preferable to all others, as it contains a most caustic lie, which consequently scours cloths and all other stuffs with promptitude, and therefore gives this sort of merchandise the texture required for thin cloths; for with a weaker soap the cloth takes a longer time in milling, which renders it liable to shrink too much; but as, in no fabric, cloth is made at present so stout and solid as formerly, on account of the gradual introduction of milling with the cylinder, and as the merchandise before described is very suitable for those new machines, it is quite indispensable for every manufacturer of soap who would serve such fabrics with their goods, to know the way of making this economic soap, and the more so, because those manufacturers who formerly could not use this soap, now employ it to scour cloth of the best quality from all its filth, and then finish milling it with a soap less mordant.

A most positive and complete proof results from these observations that it must be regarded as an indispensable necessity.

Besides this, many of the manufacturers of the Rhenish provinces, as well as those of Belgium, make only thin cloths, and stuffs for pantaloons, and for many years have used only this economic soap, and on that account have obtained great reputation for the clearness and purity of their merchandise.

To those to whom this soap is not yet known, we will remark, that it is hard, brown, and transparent; that it is made from tallow, cocoanut oil, and a little oil of colza, and with lie of potash only, and with respect to which, the principal aim should always be to work with it so that it becomes neither white nor soft, an object we have not obtained until after an infinite number of experiments, and at a very considerable pecuniary sacrifice, and moreover with incessant perseverance.

We were for a long time firmly convinced that this article should be boiled in the same manner as the green soap, as it appeared exactly to resemble that article, and we used in its preparation nothing but tallow, and oil of colza; but we had always to listen to re-

peated complaints that the soap was not caustic enough, and much less so than that received from Belgium. Lately, and since we have used some cocoanut oil, we have neither heard complaints nor objections.

Another principal defect of this soap when boiled according to the method in making green soap, which left all the lie in the soap, consisted in its not remaining perfectly clear, but showing at first some white spots, which afterwards became soft. This defect has ceased since we took away a part of the lie, and since then we have had reason to congratulate ourselves in producing a fine and good article, which, after proportions of greater or less evaporation, has kept three or four months without showing white spots, which appeared in seven or eight days sometimes in the merchandise we prepared formerly.

Our present method is the following. For a hundred kilos of Russian potash we take the same quantity of lime, which we slack on the floor till it becomes a humid powder by means of weak lie, but so, that it produces no dust, and does not stick together. This lime remains on the ground two days to get cool, so that it does not form into a mass when

in the reservoir, and that the lie may run through it. Then the potash is poured among the lime, and the mixture put into a tub or reservoir of flat shape, with a double bottom, and weak lie added, till no more enters into the lime, and appears liquid on the top of it. Between the double bottom there should be a bung hole which can be closed with a spigot. The next day, the spigot is drawn out, and the lie let run out for four hours into a vessel placed to receive it, and this must be renewed daily, till the lie shows no more than fifteen degrees.

Also each of these runnings must be kept separate, because the boiling must commence with the weak lie and finish with the strong. When the soap is to be boiled, the lie must be brought either by evaporation or by using fresh potash to certain proportions in strength; for example, one-third to eighteen degrees, one-third to twenty-four degrees, and one-third to thirty degrees.

If it is intended to have a boiling of six quintals, then the following ingredients will be wanting.

380 tallow,
70 oil of colza,

150 cocoanut oil,
or
225 tallow,
225 tallow oil, (oleine,)
150 cocoanut oil,
or
150 tallow,
300 whitened palm oil, (hot,)
150 cocoanut oil.

For every boiling of a hundred pounds of grease, fifty pounds of Russian ashes are calculated to be needful. The tallow and the oil are first saponified in the boiler, but the cocoanut oil should in every case be kept to the last.

Therefore, after the proportions as above, four hundred and fifty of grease can be saponified, and which can be calculated as nine measures of fifty pounds each. For this mass there must be used,

5 measures of lie at 18 degrees,
5 " " " " 24 "
5 " " " " 30 "

As we have before observed, the solution of the soap with the weak lie must be effected by the ebullition; then the whole quantity

must be added by degrees, so that at the end of two hours, all must be entirely mixed with the soap, and the ebullition kept up till the lie is separated from the soap, and the proof, when taken out, flows from the spatula exactly as if the soap had been unsalted by means of salt.

It is also known by the ebullition if the lie is separated from the soap, because when separating, the soap does not boil in a thick paste, but begins to froth, and is thin in the boiler, whereas, before, it boiled in large bubbles.

By this continual saturation with the lie, and when separated from it by a constant ebullition, the soap is no longer firm nor clear, but, on the contrary disturbed, and has all the appearance of a white soap unsalted. When this appears, the fire must be taken out, and the soap with the lie drawn off from the boiler into another reservoir, and left to repose, that the lie may become separated.

When the soap is put again into the boiler, the cocoanut oil, already cleansed from all the wood and dirt it might have contained, is then added, and lie of potash also, in a sufficient quantity, that when the soap is proved

on the glass it shows itself clear once more, and tastes a little mordant on the tongue, and appears firm on the glass. If the mordant is present, and still the soap is not sufficiently hard, this defect will be remedied by continuing to boil, and making the water evaporate. It is a fixed rule, that the gray of this soap should show as strong on the proving glass, as that of a finished green soap, but should also disappear from the glass in half an hour. When the gray remains longer, it proves that the soap is too strong in lie, and in that case a little more cocoanut oil must be added; but if, on the contrary, it is too weak in lie, it is known by its not possessing any mordant, and its suitable firmness. It must be kept in view that the soap is apt to redden at the bottom, which must be prevented by carefully stirring it, and with activity. The soap must then be left to rest in the boiler as long as possible, and not drawn off too warm into the forms, which would impede its being taken out well, and also we might find a mottled soap.

The forms should be one foot high by one and a half wide, and three feet long, and a little wider on the top than at bottom, so that, on turning it, the soap may be taken

out easily; a soap of this kind and thus manufactured, yields from two hundred and twenty to two hundred and forty pounds of finished soap from one hundred pounds, but this depends upon the greater or less quantity of lie drawn away. To succeed in making a good article, it is quite indispensable to separate the lie from the soap; for when prepared like the green soap, which always retains all its lie, it keeps very badly.

The lie which is separated has drawn away all the saline parts, and those charged with Glauber salts from the soap, which is a great advantage for this reason, because the same parts would form white crystals of salts, and consequently tend to soften the soap.

The lie which is separated should by no means be added to the other in the reservoir, as it would frustrate the object of removing all foreign and injurious matters from the soap: it is better, when a quantity of such lie is collected, to boil a white, hard, salted soap, which can equally be sold at a profit to the cloth manufacturers.

Before being used, this economic soap must be diluted in six or eight parts of cold water, and during the milling must be poured on the cloth in a state of thin fluid. When the

soap is given in too large quantities on fine colours, the colour suffers from it, and in white cloth, after the dyeing, what are called clouds will appear, and for that reason, great attention must be paid not to use the soap in a thick, but on the contrary in a thin fluid.

Resin, salt and soda cannot be used for this soap; because the first of these substances is injurious to the cloth, and the two others spoil the soap.

Preparation of soap for bleaching Indiennes.

The soap intended for this purpose should not coagulate quickly, should hold but little of saline matter, should be greasy without being in a state of solution, or being thready, or giving out an unpleasant odour.

It is prepared thus :

30 of tallow,
45 whitened palm oil,
25 cocoanut oil.

The tallow and palm oil are brought to a state of a hard grained soap by means of ebullition with soda lie; after which the lie which is under the soap is drawn off, and the purified cocoa-nut oil is then added to the soap in the boiler, and both made to boil to-

and unsalted, and is left in the boiler on the lie, without having been brought to boil.

For every hundred pounds of olive oil, fifteen pounds of cocoanut oil are required, which must have been previously brought by boiling to a state of cocoanut oil soap; for each hundred pounds of cocoanut oil, two hundred pounds of soda lie at sixteen degrees are necessary. This soap must be poured in a state of heat on the olive oil soap, and both raked well together.

If after this addition, the soap is not yet liquid, but thick, and grained, then some buckets of weak lie at two degrees must be poured in, till it becomes thin enough; but in case the lie running from the soap should have a mordant taste, then some pure water must be simply added.

After the soap has cooled two days, it is to be poured into the form, and even if it should be a little soft after being cut we must not on that account entertain fears for its goodness; for when it has been in the store-house two or three weeks it will have acquired of itself its proper firmness.

